THE OLD WORLD SPECIES OF PRUNUS SUBG. LAUROCERASUS INCLUDING THOSE FORMERLY REFERRED TO PYGEUM

C. KALKMAN
Laboratory for Experimental Plant Taxonomy, Leyden

CONTENTS

1. INTRODUCTION AND SUMMARY

The present study was originally intended to be a taxonomic revision of the genus *Pygeum* (Rosaceae). This genus was always considered to be closely related to, but different from *Prunus*. However, the delimitation of *Pygeum* against *Prunus* subg. *Laurocerasus* appeared to be extremely difficult, and after careful consideration I was compelled to reduce *Pygeum* to *Prunus*. This reduction is the most radical taxonomic novelty in the present paper (Chapter 3).

A new subdivision of subg. *Laurocerasus*, now enriched with *Pygeum*, was inevitable. Three sections are distinguished here, viz.:

a. sect. *Laurocerasus*, containing the Eurasian and tropical Asiatic species which were already considered by older authors to belong to the (sub)genus *Laurocerasus*, and moreover the two African species of the former genus *Pygeum*;

b. a still unnamed section containing the tropical and subtropical American species of the subgenus;

c. sect. *Mesopygeum*, containing the large majority of the species of the former genus *Pygeum*.

The morphological differences between the three sections are not very large. This emphasizes even more the irrationality of upholding *Pygeum*, which has in broad lines been reduced from genus to section (Chapter 4).

This work is restricted to the Old World species and the American section is not included.

The taxonomic revision proper is preceded by a chapter on the morphology of subg. *Laurocerasus* (Chapter 5). Other than morphological characters have not been used for the taxonomy, but in Chapter 5 attention has also been given to what is known of anatomical, cytological, and chemical characteristics.

In the course of the work some consideration was given to the delimitation of subg. *Laurocerasus* in its new circumscription against the other subgenera of *Prunus* (especially against subg. *Padus*), but nothing new can be added from my examination (see p. 7).

Specific delimitation in the present revision differs considerably from that accepted by Koehne (1913—1915). Several of the species accepted have, through their wider concept, a respectable list of synonyms.

Twelve new species have been described, five of which from New Guinea, the distributional centre of sect. *Mesopygeum*. The reduction of *Pygeum* made it necessary to publish 22 new combinations and two new names.

Thanks to the cordial cooperation of the Directors of several herbaria it was possible to study a large amount of herbarium material, at least five times as much as Koehne had at his disposal for his revisions half a century ago. Many thanks are due to the Directors of the herbaria at Berkeley, Bogor, Brussels, Calcutta, Cambridge (Mass., U.S.A.), Dehra Dun, Edinburgh, Kepong, Kew, Kuching, Leiden, London (Brit. Mus.), New York, Paris, Singapore, Uppsala, Utrecht, Wageningen, and Washington for their kind cooperation.

Miss Ruth van Crevel made all the drawings in the lively style that collaborators and users of Flora Malesiana are already acquainted with. I have to thank her cordially.

2. HISTORICAL NOTES

The *Prunus*-alliance has in the past sometimes been split into several genera, a practice which already started with De Tournefort (1700), who described *Prunus*, *Armeniaca*, *Persica*, *Cerasus*, *Amygdalus*, and *Laurocerasus*. Other older authors who were in favour of splitting *Prunus* are Linnaeus (1753) and Endlicher (1840): *Amygdalus* and *Prunus*; De Candolle (1825): *Prunus*, *Armeniaca*, *Persica*, *Cerasus*, *Amygdalus;* Roemer (1847): *Padus*, *Laurocerasus*, *Amygdalus*, *Amygdalopsis*, *Persica*, *Armeniaca*, *Prunus*, *Cerasus*, *Microcerasus*, *Ceraseidos*.

Already in 1865, however, Bentham & Hooker coined an inclusive genus *Prunus*. This procedure was followed by Focke *in* Engler & Prantl (1891) and by Koehne (1893 and later). Under influence of these authoritative works recognition of a large genus *Prunus*, divided into a smaller or larger number of subgenera and/or sections, became common practice, and also in more recent times the splitting of *Prunus* into several genera is rarely advocated. An exception is e.g. Komarov (1941), who recognizes 7 genera: *Armeniaca*, *Persica*, *Amygdalus*, *Laurocerasus*, *Padus*, *Prunus*, and *Cerasus*.

It must be said indeed, that even as subgenera the groups are not very sharply delimited and that generic status is certainly more than they deserve.

Our interest lies especially in subg. *Laurocerasus*. As a group, this goes back to De Tournefort (1700) who put the species now known as *Prunus laurocerasus* and *P. lusitanica*, in his genus *Laurocerasus*. In his first publications Linnaeus transferred those species to the genus *Padus* (Hort. Cliff., Gen. Plant. editions before 1754), but in Sp. Plant. (1753) the two species were placed in the rather inclusive genus *Prunus* (see above) under the names they still bear.

In later times the genus *Laurocerasus* was revived by some authors, as was the case with *Padus*, the problem of the relation between the two being solved in different ways.

The addition of other species to this initially European group was rather slow and started with some American species: *Padus caroliniana* Mill. (1768), transferred to *Prunus* by Aiton (1789), and *Prunus occidentalis* Sw. (1800). The first tropical Asiatic species to be described were *Prunus spinulosa* S. & Z. (1845), *Prunus macrophylla* S. & Z. (1845) and *Cerasus acuminata* Wall. (1831) which was brought to *Laurocerasus* by Roemer (1847). (The latter two species are now called resp. *Prunus zippeliana* Miq. and *Prunus wallichii* Steud.).

The most important mile-stones in the taxonomic history of *Laurocerasus* are:

a. Roemer's monograph of the *Amygdalaceae* (1847) in which were recognized both *Padus* and *Laurocerasus*. In the latter genus Roemer enumerated 19 species.

b. Schneider's summary in his 'Illustriertes Handbuch der Laubholzkunde' (1906). Schneider followed Roemer in maintaining *Laurocerasus* as a genus (with 22 species).

c. Koehne's revision (1915) of *Laurocerasus* which he reduced to a section of *Prunus* subg. *Padus*. Koehne described many new species, and the total number of species in the section rose to 62.

For a more detailed review of the history, see McVaugh (1951).

The genus *Pygeum* dates from 1788, when Gaertner described some loose fruits sent to him from Ceylon, as *Pygeum zeylanicum*. Although some few species were originally described in other genera *(Polydontia, Germaria)*, those genera were already soon transferred to *Pygeum*, and after the middle of the 19th century there was hardly any disagreement about the limits and status of *Pygeum*.

The only revision of the genus is the one by Koehne (1913, additions in 1915b), but before and after him many authors described species and/or gave local revisions, e.g. Hooker *f.* (1878), King (1897), Koorders & Valeton (1900), Elmer (1913), Cardot (1920), Ridley (1922), Merrill (1923, and many other publications), Craib (1931), Meeuse & Adelbert (1943), to mention only a few.

The only species ever described in *Pygeum* from regions outside Asia are: *P. africanum* Hook. *f.* (1864), *P. turnerianum* F. M. Bail. (1893), and *P. crassifolium* Hauman (1952).

After Koehne no one undertook a study of the *Prunoideae* over their whole area. Thus it did not appear that the differences between the group of American species (since *c.* 1800 always placed in *Prunus* or in one of its derivatives) and the group of tropical Asiatic species placed in *Pygeum*, are very slight indeed. This aspect is considered further in Chapter 3.

3. THE REDUCTION OF PYGEUM

In this chapter the names are used in their 'orthodox' meaning:

Prunus: in the sense of e.g. Koehne and Focke, i.e. inclusive and large, but with the exclusion of *Pygeum;*

Pygeum: in the sense of Koehne, including the African species, but without *Prunus pygeoides* (which has some synonyms under the generic name *Pygeum*);

Laurocerasus: the subgenus as understood by e.g. Rehder (1940), not including subg. *Padus*, and of course without *Pygeum*.

The two genera *Prunus* and *Pygeum* are in all works that consider the case contrasted along the same lines. As examples we may cite:

Focke (1891)
— Kelchblätter und Blumenblätter klein, zahnartig, oft 10—15 (*Maddenia* and) *Pygeum*
— Blumenblätter kronenartig, selten fehlend . . . . . (*Prinsepia* and) *Prunus*

Cardot (1920)
— Calice à divisions plus ou moins nombreuses; pétales nuls ou très petits et différant peu des divisions calicinales; cotylédons très épais et charnus . . . . . *Pygeum*
— Calice à 5 divisions; pétales toujours bien différents des divisions calicinales; cotylédons non ou modérément épais . . . . . *Prunus*

Backer & Bakhuizen van den Brink (1963)
— Petals 5, distinctly different from sepals; drupe. Leaves entire or not. . . . *Prunus*
— Petals not or hardly different from sepals, or absent; fruit drupaceous, dry. Leaves entire. . . . . *Pygeum*

Although Koehne did never explicitly state what he considered the most important differences between the two genera, it is clear from his treatment that he also conformed to the above-mentioned conception.

It cannot be said that these formulations are untrue, but they are rather simplified. In the flowers of *Prunus* there are indeed two whorls of perianth segments present, and the petals are in the majority of species distinctly larger than the sepals and clearly different from them. In *Pygeum* the situation is more difficult to describe. In part of the species the perianth segments are all more or less alike and not regularly differentiated as sepals and petals, but in other species there are as well as in *Prunus*, two whorls of perianth segments distinguishable; although in those species sepals and petals rarely differ appreciably in their *dimensions*, they can easily be distinguished by their *shape* and *consistency*. See fig. 1.

The difference in this respect, when accepting the old generic delimitation, would have to be formulated as follows:
— Perianth segments 5—14, subequal, or the perianth regularly biseriate and the whorls by their shape distinguishable as sepals and petals, but then the petals not more then 1½ times as long as the sepals (rarely up to twice as long) . . . . . *Pygeum*
— Perianth always differentiated as sepals and petals (although irregularities like supernumerary petals *etc.* do occur), normally 5-merous, the petals usually at least twice as long as the sepals, rarely less than that (down to 1½, and even to 1¼ times) . . . *Prunus*

This certainly is a difference, but it is unsharp through overlapping, and to my mind it is certainly not one which can keep two genera separated. Correlating differences are absent, as shown by the following survey in which *Pygeum* is contrasted with *Prunus* subg. *Laurocerasus*, the subgenus to which it is certainly most closely allied and in which the 'pygeoid' character of little difference between sepals and petals is found. The other subgenera have the well-known showy flowers with the petals distinctly larger than the sepals.

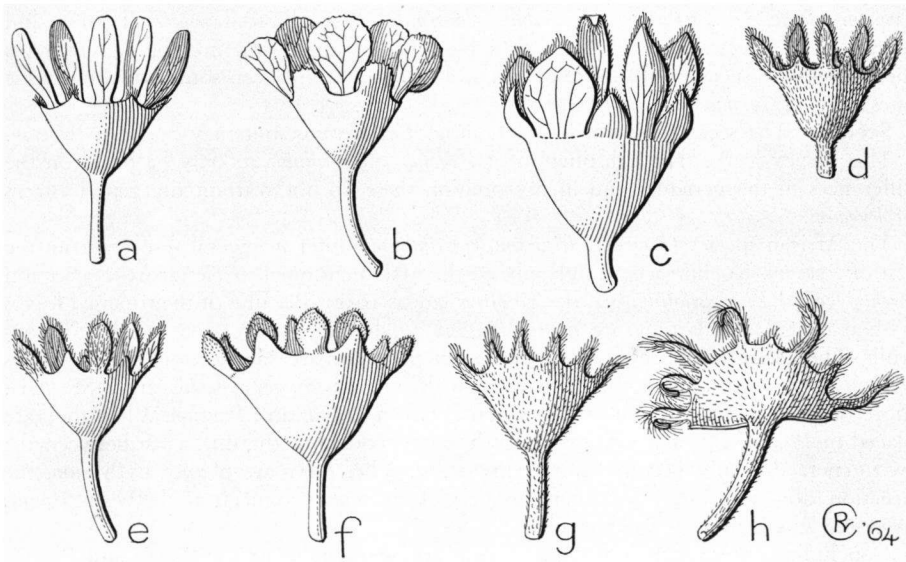


Fig. 1. Perianths in *Pygeum* and *Prunus* subg. *Laurocerasus*. a. *P. wallichii* and b. *P. phaeosticta:* clear difference of sepals and petals. Both species belong to sect. *Laurocerasus*. — c. *P. costata*, d. *P. ceylanica*, e. *P. africana*, and f. *P. dolichobotrys* are examples of '*Pygeum*' species, in which sepals and petals are well distinct, though usually not very different in lenght. But compare e.g. b. and d. — g. and h. *P. arborea* var. *arborea* is exemplary for several species of '*Pygeum*': all perianth segments are more or less equal, or when unequal, there is no regularity to be observed.

Stamens and style are not drawn. In h. the hypanthium is cut lengthwise and laid open, to show all perianth segments. — All figures × 4. (a. from *Ward 10203;* b. from *Ford s.n.;* c. from *Brass 4221;* d. from *Parkinson 14707;* e. from *Rudatis 860;* f. from *Womersley NGF 3700;* g. from *De Monchy 1;* h. from *Lütjeharms 4360*).

Leaf. — *Prunus* species usually have leaves with incised margins, but subg. *Laurocerasus* is exceptional in this respect, since the majority of its species has entire leaves, some have entire to serrate ones, and a minority is provided with leaves that are always distinctly serrate or dentate. *Pygeum* leaves are entire, except in *P. africanum* and *P. crassifolium* from tropical Africa.

Basal leaf-glands. — *Pygeum* has flat glands (usually 2) on the under-surface of the leaf or (in some 8 species) the glands are hollowed but still on the leaf-blade. The only exceptions are again found in *P. africanum* and *P. crassifolium* where the glands are situated in the margin. In subg. *Laurocerasus* the glands are of different position:

a. in most species (the American ones and e.g. in *Prunus laurocerasus, phaeosticta, wallichii*) they are flat and on the blade, sometimes very near the margin;

b. in *Prunus pygeoides* and *spinulosa* the glands are found in the margin;

c. in *Prunus adenopoda, javanica, zippeliana* they are on the petiole.

Inflorescence. — In both *Pygeum* and subg. *Laurocerasus* the inflorescence is a leafless, bracteate, axillary raceme. In *Pygeum* the racemes are sometimes placed in bundles (fascicles) but this also occurs in some species of *Laurocerasus*.

Flower. — No differences except the above-mentioned one in the perianth.

Fruit. — In typical *Pygeum* the drupes are transversely ellipsoid, sometimes didymous; in typical *Prunus* they are ovoid or ellipsoid. Exceptions to this rule are present: several

Pygeum species *(i.a. fragrans, lancilimbum, oocarpum)* have ellipsoid or ovoid fruits, and several more species have globular or subglobular drupes. And in subg. *Laurocerasus* there are many species with more or less globular fruits, and even some with transverse ones *(Prunus guanaiensis, myrtifolia)*. See fig. 6 on p. 15.

Seed. — The seedcoat is not hairy in subg. *Laurocerasus*, but may be so in *Pygeum*.

This survey learns that a distinction of *Pygeum* and *Prunus* can only be based on the differences in the perianth, and in my opinion these do not warrant the generic status of *Pygeum*.

The African species *(Pygeum africanum, crassifolium)* differ in several respects from the rest of *Pygeum*. Koehne accordingly placed the first-mentioned species apart in a section *Archopygeum (P. crassifolium* was described as late as 1952). Because of their incised leaves with marginal glands they are more like *Prunus*, but they have transversely ellipsoid fruits. The perianths are regularly biseriate but the petals are hardly more than 1½ times as long as the sepals. These species, as well as the related *Prunus pygeoides* from SE. Asia, more or less occupy a transitional position between *Prunus* and *Pygeum*. When they are placed in *Prunus*, *Pygeum* becomes more homogeneous, but the difference between the two genera does not become more convincing. When they are placed in *Pygeum*, the situation does not improve either, because of the clear connections between *Prunus pygeoides* and genuine *Prunus* species.

Concluding, there is no possibility for an arrangement in which *Prunus* and *Pygeum* (be it emended or not) remain as separate, well-defined genera next to one another.

As said above, *Pygeum* becomes more homogeneous if *P. africanum* and *crassifolium* are eliminated, and this has accordingly been done in the present revision.

Is it possible then to consider the thus-emended *Pygeum* as a subgenus near the related subg. *Laurocerasus*? A consideration of the differences, as given above (p. 4), to my mind convincingly says no: the difference in the perianth, the only one that holds, is not of a quality that must be required for distinguishing subgenera, it is a difference of a lower standard than those used for delimiting the other subgenera in *Prumus*.

So we are faced with the necessity to merge *Pygeum* with subg. *Laurocerasus*, and the next problem is the subdivision of that subgenus.

4. SUBDIVISION OF SUBGENUS LAUROCERASUS

First some words about the delimitation of the subgenus itself. Within *Prunus* it is closely related to subg. *Padus* with which it was united by some authors (e.g. by Koehne) because of the racemes they have in common, as opposed to the few-flowered inflorescences or even the solitary flowers in the other subgenera.

Koehne (1915a) divided subg. *Padus* as follows (this subdivision is different from that given by him in 1912):

subg. *Padus*
- grex *Calycopadus* (entire hypanthium persistent under fruit)
  - sect. *Neocalycinia*
  - sect. *Calycinia*
  - sect. *Iteocerasus*
- grex *Gymnopadus* (hypanthium only partly persistent)
  - sect. *Laurocerasus*
    - subsect. *Malacocraspedon* (no thick-walled cells in leaf-margin)
    - subsect. *Sclerocraspedon* (sclerenchyma in leaf-margin)
    - subsect. *Mesocraspedon* (collenchyma in leaf-margin)

sect. *Eupadus*
subsect. *Pachypodium*
subsect. *Grayopadus*
subsect. *Leptopodium*
subsect. *Maackiopadus.*

More recently it is usual to distinguish two subgenera, *Padus* and *Laurocerasus*, on account of two differences:

— Deciduous. Leaves at the base of the raceme . . . . . *Padus*
— Evergreen. Racemes with bracts only . . . . . *Laurocerasus*

This line of reasoning one finds in most of the more recent works, like Rehder (1940) and Krüssmann (1962). I am convinced that it is a more satisfactory subdivision than the one that Koehne advocated.

Koehne's grex *Calycopadus* then has to be placed either in subg. *Padus*, or in subg. *Laurocerasus*, in the sense of Rehder. *Prunus serotina* (to which McVaugh, 1951, reduced the five species Koehne discriminated in sect. *Iteocerasus*) is undoubtedly a species of subg. *Padus*. Only the species of sect. *Neocalycinia* and sect. *Calycinia* may give some difficulties in assigning them to one or the other of the subgenera. In sect. *Neocalycinia* Koehne summarized four species *(P. barbata, cornifolia, rhamnoides, urotaenia)* but I suspect that only one species is concerned here. The same can be said of the four species that Koehne enumerated in sect. *Calycinia (P. buergeriana, perulata, stellipila, undulata)*. These species are deciduous but have leafless racemes. In view of the domatia they have in their nerve-axils they can best be placed in subg. *Padus* where domatia are frequently found, whereas they are unknown in subg. *Laurocerasus*.

In *P. maackii* there is according to the description the same situation: deciduousness and leafless racemes. Krüssmann placed the species in subg. *Cerasus*, I myself cannot give a judgment about this, not having seen any material.

In sect. *Laurocerasus* Koehne distinguished three subsections based on anatomical characters. I checked this for some species of the former *Pygeum* but found that collenchyma in one and the same species may be present or absent in the leaf-margin. Besides it being a very unpractical character I do not believe it is as strict as Koehne assumed it to be. Consequently I tried to make another subdivision based on morphological characters. After careful consideration the following subdivision seemed the most profitable and natural one, though admittedly the sections cannot be discriminated by absolutely sharp distinctions, no single character being confined to any of the three.

— Leaves serrate or entire; basal glands in the margin, or on the under-surface of the blade, or on the petiole. Petals distinct, (1¼—) 2—8 times as long as sepals. Fruits usually ellipsoid or ovoid, sometimes globular, rarely transversely ellipsoid. Subtropical and cool-temperate Eurasia, tropical Africa, tropical Asia from India to New Guinea.
sect. *Laurocerasus*

— Leaves entire; basal glands on under-surface of leaf-blade, flat or more or less deeply hollowed (in some species not in the blade proper, but in the contracted leaf-base). Petals not or hardly different from sepals, or, if distinct, not more than 1½(—2) times as long as the latter. Fruits usually transversely ellipsoid to didymous, sometimes globular, rarely ellipsoid. Tropical Asia from India to Solomon Is, 1 sp. in Australia.
sect. *Mesopygeum*

— Leaves entire, rarely serrulate, especially to the apex (rarely distinctly dentate: *P. ilicifolia)*; basal glands on under-surface of blade, flat, sometimes near the margin.

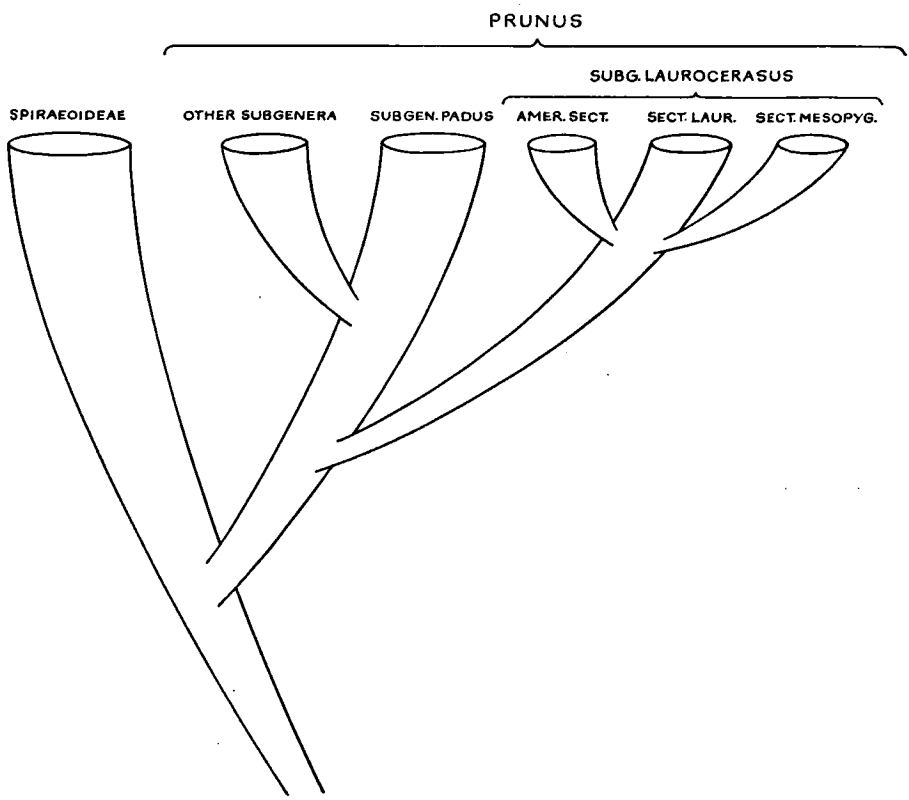


Fig. 2. Speculative phylogenetical tree, showing the supposed relationships between *Padus* and *Laurocerasus*, and between the three sections of the latter. The other subgenera of *Prunus* have not been elaborated, other genera of *Prunoideae* and other subfamilies of *Rosaceae* have been omitted.

Petals distinct from sepals, 1½—4 times as long as the latter. Fruits globular to ellipsoid, rarely transversely ellipsoid. Tropical America (about 25 species?), few species in North-America . . . . . *unnamed section*

The two last-named sections are certainly homogeneous assemblages; the tropical American species hang with their N. American relatives mutually close together and so do the Australasian species of the former genus *Pygeum*.

From the old *Pygeum* have been removed *P. africanum* and *P. crassifolium* which are very different in habit. The former is closely related to the Asiatic *Prunus pygeoides (Pygeum andersonii)*, and the two are certainly allied to *Prunus lusitanica;* the African species have consequently been placed in sect. *Laurocerasus*.

Compared with the other sections, *Laurocerasus* is less homogeneous, partly because of the transfer of the African species. On the other hand there are strong connections between the species. It could be speculated that sect. *Laurocerasus* forms the ground-stock of the subgenus and that two of its branches have become independent enough to be considered sections of their own. This view is illustrated in fig. 2, a kind of phylogenetical tree. Although of course only a speculation and very incomplete at that, I believe that the picture it gives may fairly well represent ancestral development.

5. PORTRAIT OF SUBGENUS LAUROCERASUS

a. Inflorescence

In the genus *Prunus* the basic type of inflorescence is the raceme, but only in subg. *Padus* and subg. *Laurocerasus* a raceme (or spike) in its typical form is always present. In other subgenera the raceme is mostly very much contracted and the number of flowers is reduced, even down to one; habit and character of the raceme consequently are then entirely lost.

This gives the possibility to use the structure of the inflorescence for the distinction of *Padus* and *Laurocerasus* on one side, from *Prunus*, *Cerasus*, and *Amygdalus* on the other. This distinction, however, is not sharp and the boundary between *Padus* and *Cerasus* especially will have to be drawn after careful consideration of all characters.

In most subdivisions of *Prunus* the subgenera *Padus* and *Laurocerasus* are placed at the end. Their logical place, however, would be at the beginning, *Padus* being the most primitive.

This primitiveness of *Padus* is illustrated in the raceme. Koehne (1915a, 281) said that the leafless raceme (as in subg. *Laurocerasus)* is more primitive than the leafy one (as in subg. *Padus)* because it is often found together with a thin endocarp (which he supposed to be a primitive character in *Prunus)*. This argumentation is false because at present it is usually understood that the separate characters have all their own phylogeny, and that a considerable difference may exist between evolution-rates in different organs ('heterobathmy'). Apart from that, Koehne's statement is morphologically highly improbable: it cannot easily be imagined that on a bracteate raceme the bracts ('reduced leaves') become normal leaves again.

It seems more logical to consider the raceme with leaves at the base (as in *Padus)* as most primitive in the genus *Prunus* (fig. 3, a). Reduction of the leaves (in *Padus* they are often considerably smaller than the normal leaves) leads to racemes with some sterile bracts at the base (fig. 3, b and c). Often these basal bracts have a form slightly different from those higher up in the raceme: they are tripartite or have a tridentate apex (see fig. 5, c, f). This must be interpreted as the bracts having retained their stipules (see p. 11); in fact, many of those empty bracts (which in some species, e.g. *P. laurocerasus* and *lusitanica*, act as bud-scales) are of a mainly stipular nature.

Reduction of the sterile bracts at the raceme-base may proceed, producing a raceme with all bracts fertile (fig. 3, e); this is, however, a rare case: *P. africana, phaeosticta.*

More complex inflorescences may originate in two ways. In the axils of the lower bracts may be found not flowers but racemes which makes the inflorescence a panicle (fig. 3, d). True panicles are extremely rare in subg. *Laurocerasus:* in *P. malayana* it is the normal situation and more exceptionally they may be found in e.g. *P. polystachya, oocarpa,* and *arborea* var. *montana.*

A more common development is the crowding of the racemes into a fascicle (fig. 3, f, g). Fascicles are present in several species of sect. *Mesopygeum* (e.g. *P. arborea, beccarii, lancilimba, turfosa)* but also as an exception in *P. wallichii* of sect. *Laurocerasus.*

In *P. polystachya* different situations are present, sometimes even on one twig, which permits us to build a mental picture how these fascicles have arisen (see fig. 4). A long shoot with the racemes in axils of leaves may change into a shoot with the racemes in axils of cataphylls and this again into a short shoot with lateral racemes. When the axis of this shoot becomes extremely shortened a fascicle is produced with a terminal bud, but the latter of course may also become obsolete.

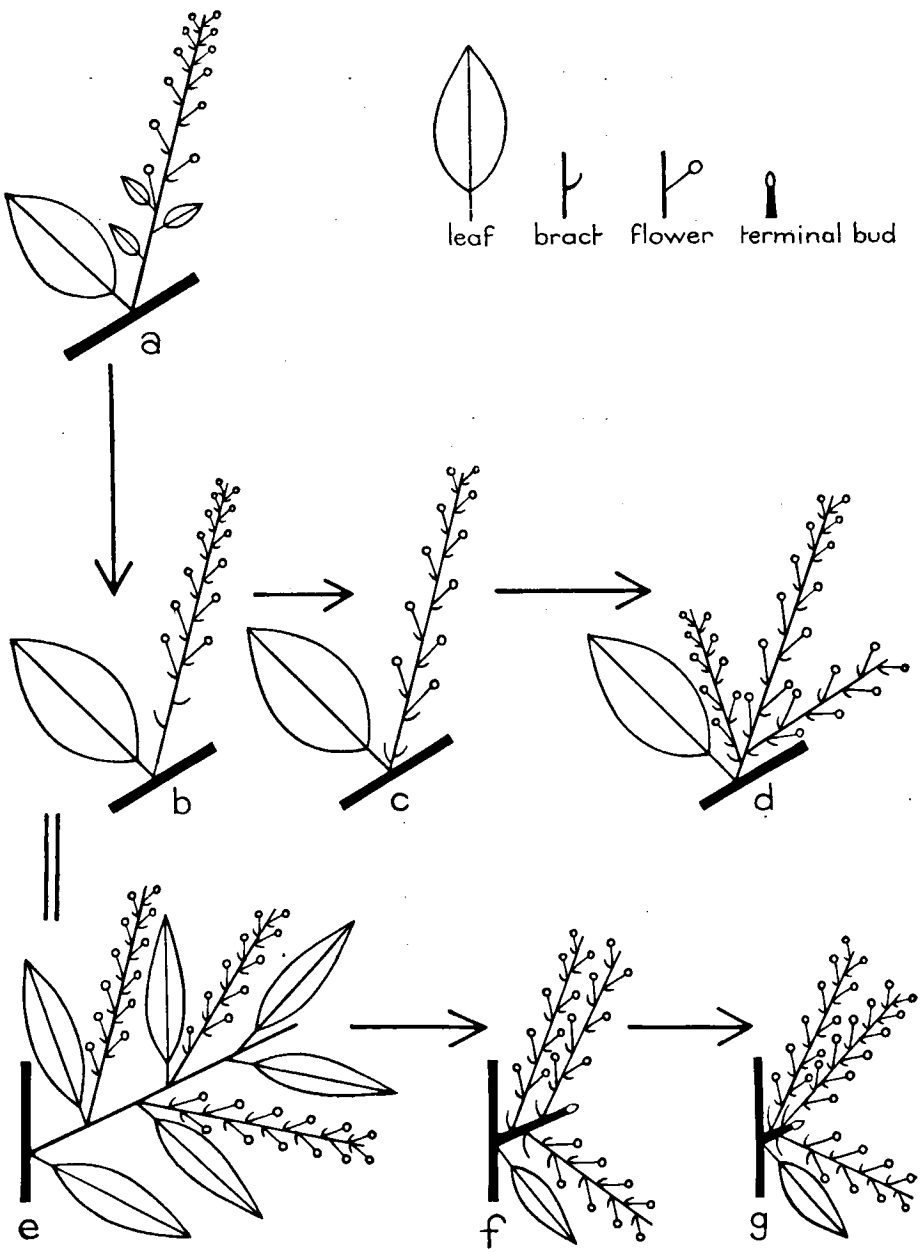


Fig. 3. Semophylesis of the inflorescence in subgenus *Laurocerasus*. For explanation see text.

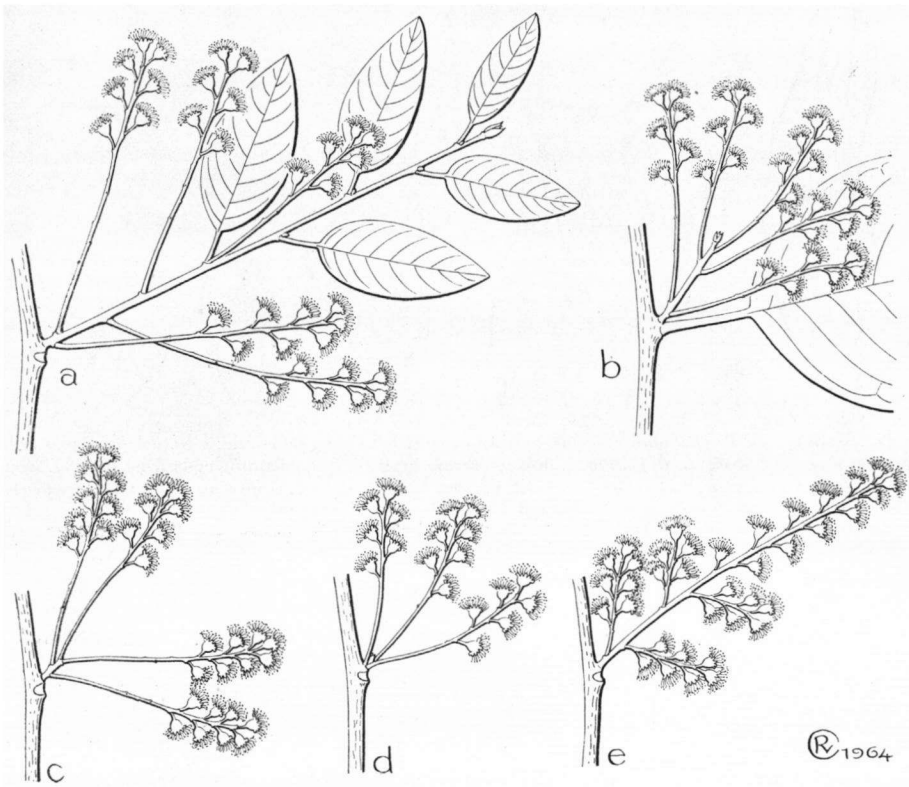


Fig. 4. Semi-diagrammatic sketches of inflorescences in *P. polystachya:* a. racemes at base of long shoot, partly in axil of leaf, partly in axil of cataphyll; b. contracted shoot with racemes in axils of cataphylls; c. idem, more contracted, terminal bud vestigial; d. shoot reduced to 0, racemes in fascicle; e. rarely a panicle is found in this species. — All drawings × 0.6. (a, c, d. from *Maingay 627;* b. from *Dumas 1603;* e. from *Maradjo 332*).

In *Mesopygeum* it is sometimes difficult to decide whether a crowded mass of racemes without apparent terminal bud is a fascicle or a panicle.

The cataphylls in the axils of which the racemes are placed — as far as they are known —, are often tripartite or have a tridentate apex, so that their appearance is just like the above-mentioned sterile bracts at the raceme-base (fig. 5, a).

b. Bracts

As mentioned above the raceme-bearing cataphylls and the basal bracts in the raceme are usually more or less deeply incised: often they have a three-pointed apex, but they can also be tripartite. Some examples are shown in fig. 5 (a, c, f).

This phenomenon can best be explained by assuming that the lateral lobes of these bracts are homologous with stipules. It is obvious, especially in the case of the larger cataphylls like in *P. phaeosticta* (fig. 5, a), that these structures are largely built from what Troll calls '*Unterblatt*', the leafbase, the part that also forms the true stipules.

This theory of the homology of the lateral lobes with stipules is supported by some

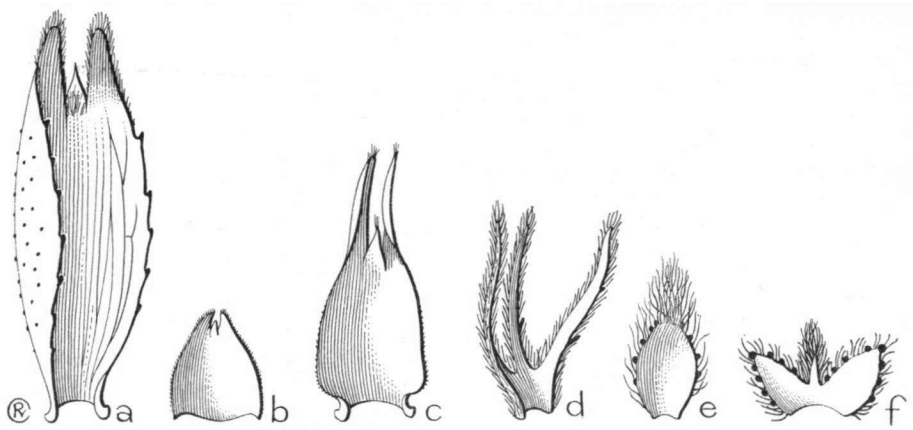


Fig. 5. Bracts. a. *P. phaeosticta*, raceme-bearing cataphyll; b. *idem*, bud-scale; c. *P. dolichobotrys*, sterile bract from raceme-base; d. *P. lancilimba*, flower-bearing bract; e. *P. spicata*, flower-bearing bract; f. *idem*, sterile bract from raceme-base. — All × 6. (a., b. from *Forrest 15802*; c. from *Carr 12726*; d. from *Pételot 4589*; e. and f. from *Sario San 28952*.)

cases where these are provided with marginal glands, while the latter are wanting in the median lobe of the bracts (fig. 5, f).

In fig. 5, b is depicted a bud-scale of *P. phaeosticta* which shows the same phenomenon of a three-pointed apex and which, consequently, has also to be considered as being of an '*Unterblatt*' nature.

Fig. 5, d shows a flower-bearing bract of *P. lancilimba*, the only species in which all bracts up to the end of the raceme are tripartite.

Bracteoles are usually absent in the subgenus. In only a few species the pedicel bears normally two minute and caducous bracteoles: *P. glomerata, oocarpa, pygeoides*. In a few more species I have observed them occasionally: *P. arborea* var. *robusta, fordiana, oligantha*. It is well possible that actually bracteoles are of a more normal occurrence than outlined above, because they have usually only been observed in very young racemes. Obviously they fall or wither very early in the development of the raceme.

c. Flower

The flower is extraordinarily uniform throughout the genus *Prunus*. Variation is mainly found in the shape of the hypanthium, the shape and dimensions of the perianth segments, the number of stamens, and in the indumentum of hypanthium, perianth, and pistil.

The *hypanthium* is always campanulate or funnel-shaped in subg. *Laurocerasus*, never tubular as in some species of e.g. subg. *Padus*.

The outer surface may be anything from glabrous to densely hairy. On the inside there is in most species only a ring of hairs around the insertion of the ovary. The inner surface of the hypanthial cup is lined with a nectary; for an anatomical description of the latter in *P. laurocerasus* see Radtke (1926).

The 'big problem' of course, presented by the hypanthium of perigynous flowers is the question of its being 'appendicular' or 'receptacular': is it formed by fusion of the bases of perianth and stamens, or is it to be regarded as a hollowed floral axis?

About this problem, and especially in its more pronounced form as presented by the inferior ovary, much has been written in the past. Even in more recent times the war

between the two camps has not entirely calmed down, as shown by publications of e.g. MacDaniels (1940) and Leinfellner (1954).

Puri (1952) gave a reconsideration of the problem of the inferior ovary and reduced it to 'a part of that everinsoluble (?) problem as to where the axis ends and the leaf begins'. He stated (p. 124) that modern studies have deprived the terms 'axis' and 'leaf' of much of their morphological significance and that they are now merely descriptive terms which serve for convenience more than anything else. The problem consequently loses much of the importance that was attached to it in the past and Puri 'no longer regards it as of any vital significance', with which statement I entirely agree.

Hillmann (1910) has shown that the vascular bundles serving the pistil of the *Prunoideae* do not enter the floral cup and drew the conclusion that the hypanthium is of an appendicular nature (in *Prunoideae*, not in all *Rosaceae*, e.g. not in *Rosa)*. As Puri (1952) has shown this same vascular ground plan may be present in a receptacular cup as well as in an appendicular one and so we are left where as we were: the nature of the *Prunus* hypanthium is an unsolved problem if we want to cling to the old notion of axis and leaf being fundamentally different organs.

The *perianth* has already been discussed at length in Chapter 3 (see p. 4 and fig. 1). The petals are white, cream-coloured, or more or less greenish, but also in the species with distinct and relatively large petals the flowers are not as showy as in many species of for example subg. *Cerasus*.

The basic pattern is two 5-merous whorls of perianth segments, but in sect. *Mesopygeum* the perianth may consist of an irregular number (5—14, rather variable also within one species) of more or less equal, small lobes.

The number of *stamens* ranges from 10 to 85 in the genus *Prunus*. A fixed number of 10 (as e.g. in *P. buergeriana* of subg. *Padus)* is probably to be considered primitive, but, although small numbers are met with in subg. *Laurocerasus*, they are never fixed. In most species of the subgenus the limits are contrarily wide apart and in one species a variation in the number of 20 or more is entirely normal.

High numbers are found in some species of sect. *Mesopygeum*, e.g. up to 55 in *P. fragrans*, 70 in *P. malayana*, 75 in *P. rubiginosa* and up to 85 in *P. polystachya*.

Judging from the herbarium material the flowers are proterogynous, the stamens being still incurved when the style has already grown to its full length and exerts above the bud. Field-observations are needed to ascertain whether the stigma is already susceptible then.

Only one *pistil* is present in the flowers of *Prunus;* the ovary is always one-celled and has 2 ovules. In the sections under consideration there is very rarely an extra abortive pistil present which is placed somewhere on the inside of the hypanthium-cup.

Functionally male flowers with a small to minute pistillodium are found in many species of sect. *Mesopygeum*, rather often e.g. in *P. ceylanica, dolichobotrys, gazelle-peninsulae, grisea* var. *tomentosa, lamponga, marsupialis, polystachya,* and *schlechteri*, less commonly in several others. In sect. *Laurocerasus* I have seen male flowers only in a few specimens of *P. wallichii*.

Mostly male and bisexual flowers are found in the same raceme, at least on the same twig, but some herbarium specimens have male flowers only and at least for *P. gazelle-peninsulae* I am fairly sure that the trees are indeed either male or bisexual (see p. 78).

In most of the species the ovary is either glabrous or densely hairy, but in some species the variational range is larger and too much taxonomical value cannot be assigned to this character. The style is — also when the ovary is hairy — usually glabrous, but there are exceptions to this.

The ovary is built up from one carpel and the ventral suture is usually well visible on the outside as a groove. According to Sterling (1964a) the suture may be open at the level of ovular insertion (*P. besseyi* of subg. *Cerasus* and *P. fremontii* of subg. *Amygdalus*) but in our subgenus this seems not to be the case.

Sterling reported in two recent papers about the vascularization of the ovary in *Prunus* (1964a) and '*Pygeum*' (1964b), and he interpreted his observations in such a way that the ovules would not be marginal on the phyllome that constitutes the ovary wall, but would be primarily axial on a forked sporangiophore (or on two separate sporangiophores) and only secondarily adnate to the phyllome. This interpretation would agree with Melville's theory about the origin of the Angiosperm ovary. Thus it appears that even in this family, where the structure of the ovary seemed to fit so well in the classical theory of the carpel as a sporophyll, it is possible to throw some doubt upon the common validity of this concept.

According to Sterling, within the genus *Prunus* the subgenera *Padus* and *Laurocerasus*, considered by him of course in the old circumscription, have the most advanced carpels; this is in contradiction with my opinion that these subgenera are the most primitive ones. It must be said that Sterling's judgment is perhaps a somewhat too easy generalization because in some characters the species he investigated (4 from *Padus*, 3 from *Laurocerasus*) are distinctly un-alike. For instance, of the three species of *Laurocerasus*, *P. laurocerasus* has 3 carpellary bundles at the base of the locule, *lyonii* has 5, and *lusitanica* more than 5.

At the apex of the locule two pendent, campylotropous ovules are attached, of which only one develops into a seed. Development of both ovules seems to be extremely rare: I remember having seen only one fruit with two seeds.

The ovules are, according to Sterling, monotegmic, at least the two integuments are fused and at the most (in part of the species only) separated in the micropylar region.

d. Fruit and seed

The one-seeded, indehiscent fruits should, according to Hance (1870, 72, footnote), not be called drupes, as is common practice, but achenes, since the mesocarp is thin and dry. He applicated this statement to *Pygeum*, but it is true for most of the species of subgenus *Laurocerasus*. Only in some species the mesocarp is up to some millimetres thick and definitely fleshy (sect. *Laurocerasus: P. adenopoda, laurocerasus, lusitanica, wallichii;* sect. *Mesopygeum: P. fragrans, glomerata, pulgarensis, turneriana).* In those cases the fruit is indeed, as in cherries, prunes *etc.*, a drupe in its classical definition.

It is a well-known fact that fruit-types are very difficult to classify, but it is certainly not wise to introduce in the fruits of *Prunus*, which are all of the same type, a terminological separation based on the degree of fleshiness of the mesocarp. Consequently I call all these fruits drupes, usually with a dry and rather thin mesocarp, sometimes with a distinctly fleshy one.

The shape of the fruit (see fig. 6) ranges from transversely ellipsoid or didymous, to ellipsoid, as was already discussed in Chapter 3 (p. 5).

The endocarp is in most of the species thin, more or less bony and easy to break, but some species have a thicker, harder and more woody endocarp which, e.g. in *P. glomerata* and *P. turneriana*, attains 1 mm in thickness, in *P. jenkinsii* even 2 mm. On the inside of the endocarp a more or less dense indumentum may be present in species of sect. *Mesopygeum*.

During the ripening of the fruit the hypanthium normally ruptures along a preformed

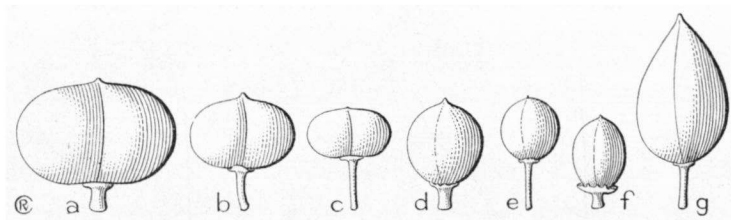


Fig. 6. Fruits. a. *P. ceylanica;* b. *P. dolichobotrys;* c. *P. africana;* d. *P. oligantha;* e. *P. phaeosticta;* f. *P. oocarpa;* g. *P. javanica.* The unfitness of the shape of the fruits for delimiting sections is demonstrated: a, b, d, f belong to sect. *Mesopygeum,* c, e, g to sect. *Laurocerasus.* — Natural size. (a. from *Wight 908;* b. from *Darbyshire & Hoogland 8249;* c. from *Bagshawe 1537;* d. from *Vink 16519;* e. from *Fang 1314;* f. from *Haviland 1118;* g. from *Schram BW 2675.*)

horizontal line, the upper part falling off. The lower part sometimes enlarges, and consequently specimens of some species *(P. costata, grisea, pullei)* may have a rather large 'fruiting calyx' which, however, is not made up from the whole hypanthium as e.g. in sect. *Calycinia* (see p. 6) but only from the lower part of it.

The seed fills the locule and consequently has about the same shape as the fruit. It has a thin testa which may be hairy, especially in sect. *Mesopygeum.* The seed is exalbuminous, the embryo has thick, semi-globular cotyledons and a basal plumule. According to Martin (1947) some little endosperm is present in part of the species of *Prunus,* but he did not mention the species in which this should be the case. I never found traces of albumen.

e. Seedling

The seedling has, as usual, only very rarely been collected. I saw three specimens only, from *P. africana (Germain 3501),* from *P. arborea* var. *arborea (Burger 2617)* and from *P. polystachya (Thorenaar 179).* A seedling of *P. ceylanica* furthermore has been figured by Talbot (1909).

Germination is hypogeal, the fruit bursts ventrally and dorsally but the cotyledons remain in the halves of the pericarp. The epicotyl is long, the primary leaves are opposite, stipulate, and normal in shape.

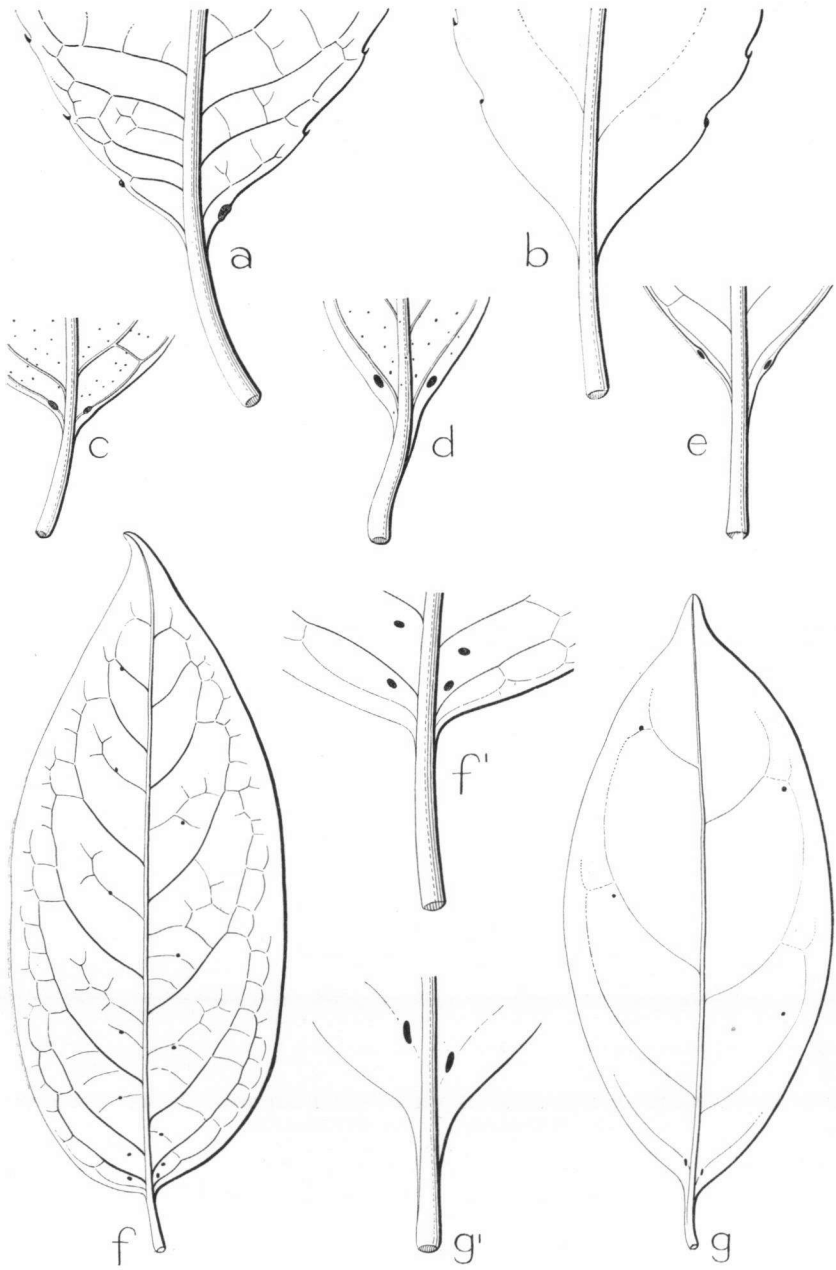
f. Leaves

The most striking peculiarity of the leaves of *Prunus* is the presence of glands in a diversity of types. In subg. *Laurocerasus* they are found on the petiole, in the margin, or on the under-surface of the blade, they may be flat, or hollowed, or cushion-shaped, mostly there are two, but sometimes they are absent or there is only one, or there may be up to 6, the basal ones may or may not be accompanied by additional ones higher up in the leaf.

In the following paragraphs an attempt has been made to bring some order in this diversity.

Let us start with a dentate (or crenate or serrate) leaf with the teeth terminated by glandular points. The first step is the lowermost glands becoming larger and independent from the teeth of the margin.

This can be observed in *P. africana, lusitanica,* and *pygeoides;* in these species there are sometimes no basal glands, sometimes the lower teeth bear larger ones than the other teeth (fig. 7, b), sometimes the large gland has become independent from the leaf-incisions (fig. 7, a).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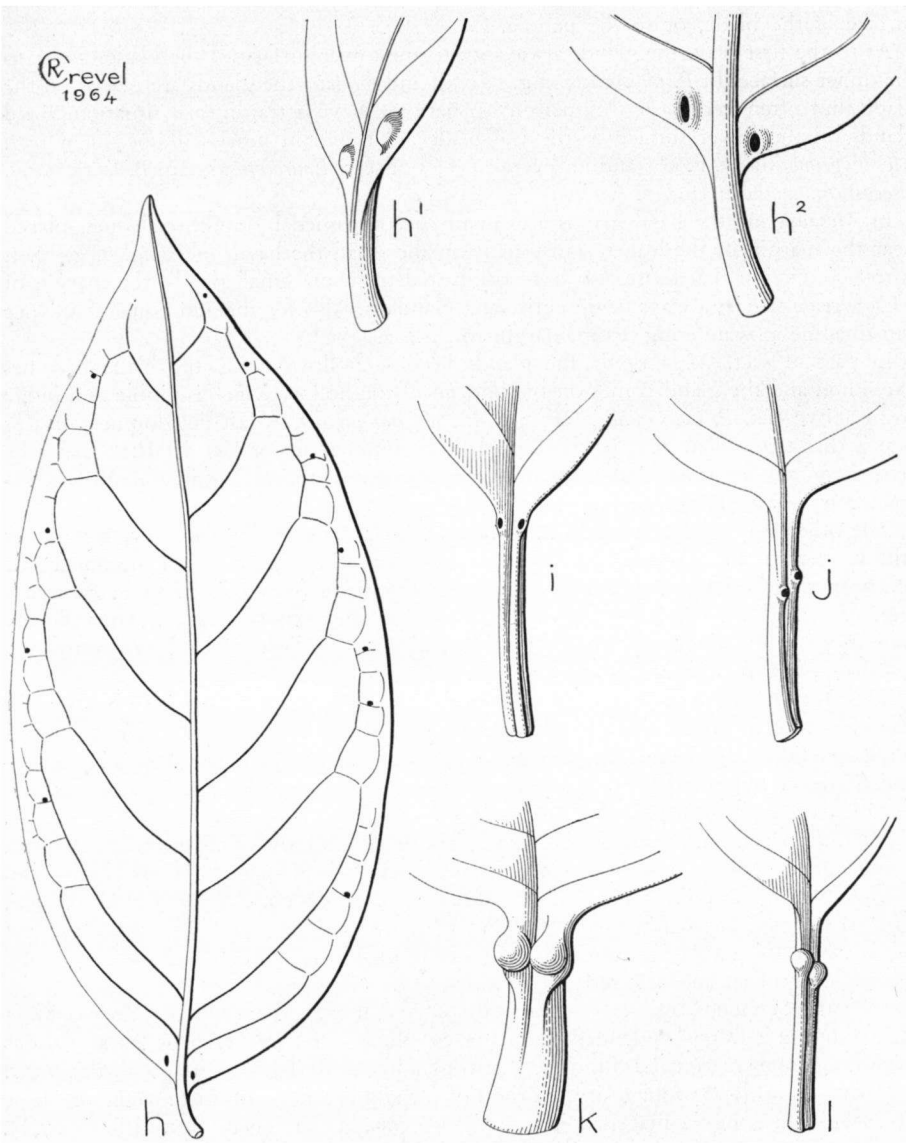

Fig. 7. Basal leaf-glands. a. *P. africana*; b. *P. pygeoides*; c, d. *P. phaeosticta*; e. *P. spinulosa*; f, f¹. *P. wallichii*; g, g¹. *P. lamponga*; h, h¹, h². *P. marsupialis*; i, j. *P. javanica*; k. *P. polystachya*; l. *P. adenopoda*. — All × 3, except f, g, h, which are nat. size. (a. from *d'Alleizette 2021*; b. from *Mahanty s.n.*; c. from *Forrest 11861*; d. from *Tsiang 1700*; e. from *Siebold s.n.*; f, f¹. from *Hooker & Thomson s.n.*; g, g¹. from *Haviland 2144*; h, h¹, h². from *Lasquety FB 25292*; i. from *Sario San 28502*; j. from *v. Steenis 1269*; k. from *Hallier s.n.*; l. from *Koorders 20298β*.)

Now we have a leaf with 2 (or 1 or 3) glands in the margin, near the base. This is found in many specimens of *P. spinulosa* (fig. 7, e). Two ways lie open now: to the surface of the blade, or to the petiole.

As to the first way, the glands always go to the lower surface of the blade, never to the upper surface. In *P. phaeosticta* (fig. 7, c, d) and *fordiana* the glands are placed on the blade, but often very near the margin, so here we have a transitional situation. Basal glands on the lower surface of the leaf-blade are found in nearly all species of sect. *Mesopygeum* (fig. 7, g, g^1), and in several species of sect. *Laurocerasus*, e.g. *P. laurocerasus*, *phaeosticta*, *wallichii* (fig. 7, f, f^1).

In *Mesopygeum* the basal glands are usually accompanied by additional ones, placed near the margin of the leaves, and usually smaller than the basal ones (fig. 7, g, h). It is my conviction that those also have originated from marginal glands, the margin of *Mesopygeum* species always being entire and glandless. Also for the additional glands we can imagine a 'wandering' from margin to surface.

In part of sect. *Mesopygeum* the glands become hollowed, i.e. the blade becomes excavated and the gland comes on the bottom of the hollow which is visible as a bulge from above *(i.a. P. marsupialis*, fig. 7, h, h^1, h^2, *rubiginosa)*. A last development in this line is that this bullate part of the leaf-blade becomes more or less detached from the rest, the glands are then — as it is formulated in the descriptions — situated in the contracted leaf-base *(P. polystachya*, fig. 7, k, *turfosa)*.

The other way goes from margin to petiole. In *P. javanica* the glands are sometimes still in the margin, though very near the base, sometimes they are on the upper side of the petiole, often considerably away from the blade (fig. 7, i, j). In *P. adenopoda* (fig. 7, l) and *zippeliana* the glands are always on the petiole. This may superficially look more or less alike to the situation mentioned above (hollowed glands in a contracted leaf-base), but is of course quite different.

This story has been presented as a historical one and indeed I believe it to be the only plausible way in which the several positions which can be observed might be linked phylogenetically. To be noted is that the story starts with a dentate leaf; this is in accordance with the hypothesis that subg. *Padus* is more primitive than subg. *Laurocerasus*, and sect. *Laurocerasus* more primitive than sect. *Mesopygeum*.

My interpretation, as given above, implies the homology of all glands, marginal, laminar, and petiolar. This homology has been denied by Dorsey & Weiss (1920) who considered (in the plums: *P. americana, besseyi, cerasus, domestica, pennsylvanica, simonii, triflora)* the petiolar glands to be of a 'different order of structure' than the glands on the marginal teeth. They regarded the petiolar glands as representing the suppressed lateral lobes of an ancestral ternately divided leaf.

Recently Schnell, Cusset & Quenum (1963) have, however, expressed as their opinion that 'l'interprétation des glandes pétiolaires est plutôt à rechercher dans leurs relations avec les glandes marginales du limbe (dents glanduleuses)'. I fully agree with this view.

A small, unsolved problem is the origin of the additional glands in *P. wallichii*. Those are not placed along the margin as in sect. *Mesopygeum*, but parallel to the midrib (fig. 7, f). They may have an origin different from those of *Mesopygeum*, but of course they could also be derived from additional glands placed along the margin.

In four species, viz. *P. fordiana, P. javanica, P. mirabilis*, and *P. phaeosticta*, the leaves are on their lower surface densely covered with black dots which are smaller than the additional glands in sect. *Mesopygeum*, but possibly also have a glandular function.

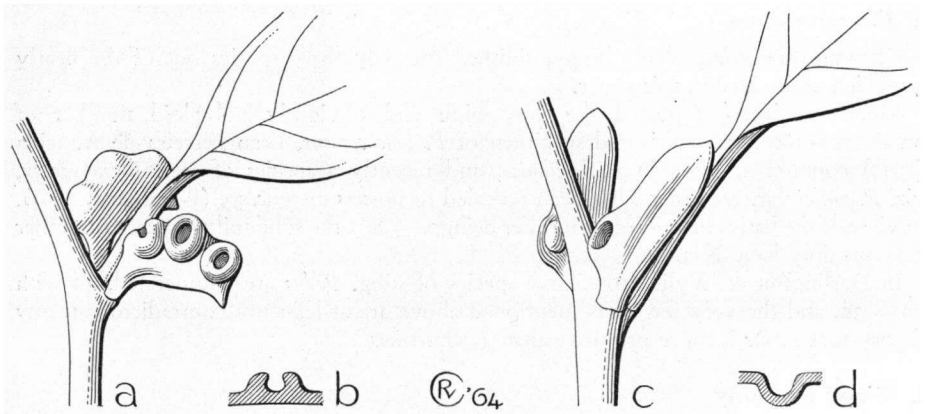

Fig. 8. Glands on stipules. a, b. crateriform glands on outer surface in *P. arborea* var. *densa*; c, d. hollowed glands in *P. beccarii*. — a. and c. × 4. (a. from *Clemens 50416*, c. from *Singh San 24015*).

g. Stipules

In almost all descriptions, also those of Koehne, the stipules are neglected. This is certainly partly due to their being usually small, caducous, and absent in many herbarium specimens. They are especially well represented in specimens in which terminal buds are on the verge, or in the course of expanding.

Some points, presented by the stipules, may be considered here more closely.

In a number of species of apparently remote relationship the stipules are more or less distinctly and more or less regularly intrapetiolarly connate with their midrib-keels. This fact has hitherto never been recorded; it is found in *P. javanica* and *mirabilis* of sect. *Laurocerasus*, and in *P. clementis*, *dolichobotrys*, *gazelle-peninsulae*, and *malayana* of sect. *Mesopygeum*. See fig. 27, d, on p. 76.

The stipules may, in various ways, be provided with glands. In the first place the margins may be glandular or even glandular-serrate; examples are found in some species of sect. *Laurocerasus*, e.g. *P. phaeosticta* (fig. 15, b, on p. 42), and in many species of sect. *Mesopygeum*, e.g. in *P. fragrans*, *grisea*, *marsupialis*, *schlechteri*, *turneriana*.

Glands may also be present on the outside surface of the stipules. In *P. arborea* they are flat (var. *robusta*, *stipulacea*) to crateriform (var. *densa*, *stipulacea*), and pustular to flat glands are also found on the stipules of *P. glabrifolia*. A stipule with crateriform glands is depicted in fig. 8, a.

In one species, viz. *P. beccarii*, the stipules are usually provided with a hollowed gland (fig. 8, c) of a type closely resembling the basal glands on the leaves of some species of sect. *Mesopygeum*. I suggest that here we have an example of a 'phylogenetic shift' of the glands from blade to stipule, i.e. from 'Oberblatt' to 'Unterblatt' (*sensu* Troll). The species mentioned is related to *P. polystachya* in which the hollowed glands are usually situated in the contracted base which is more or less distinctly set off from the rest of the blade (see fig. 7, k). In *P. beccarii* there are (a significant fact!) no basal glands on the blade, but one is present on each stipule. It seems not too far-fetched to suppose that here indeed the glands have shifted their place from one organ to another in the course of the phylogeny.

h. Chromosomes

Chromosome counts have been published for only three species out of the nearly 50 which are treated in this paper.

Meurman (1929) reported the very high and obviously polyploid number of 2n = 170—180 for a cultivated specimen of *P. laurocerasus*, Leao Ferreira de Almeida (1947) counted 2n = 64 in *P. lusitanica*, and recently a species of sect. *Mesopygeum*, viz. *P. pullei* var. *grandiflora*, has been revealed to possess 2n = *c.* 35 (Borgmann, 1964). In view of the basic chromosome number being x = 8 in the subfamily, the latter number may possibly have been 2n = 32.

In Darlington & Wylie (1955) five species of subg. *Padus* are enumerated, all with 2n = 32, and the very few facts mentioned above are at least not contradictory to my theory that *Padus* is more primitive than *Laurocerasus*.

i. Wood anatomy

Few detailed observations have been published about the wood anatomy of the two sections. The timber is hardly of commercial value and that usually implies little knowledge of its anatomy.

Besides some more generalized accounts (den Berger & Endert, 1925; den Berger, 1926; Metcalfe & Chalk, 1950) I have found anatomical descriptions of six species, viz. *P. adenopoda* (Moll & Janssonius, 1918), *P. africana* (Lebacq, 1957; Kribs, 1959), *P. arborea* (Moll & Janssonius, 1918; Beekman, 1920), *P. grisea* (Moll & Janssonius, 1918; Reyes, 1938), *P. javanica* (Moll & Janssonius, 1918), *P. polystachya* (Desch, 1954).

The main distinctive characters of the secondary xylem are: Vessels in small radial groups and solitary; perforations always simple. Rays in two kinds, uniseriate ones more abundant than multiseriate ones. Paratracheal parenchyma present, thin; metatracheal parenchyma sometimes present, irregularly spaced, the bands more or less wide; scattered parenchyma present in very variable quantities. Traumatic gum ducts recorded for some species, but obviously the number varying from sample to sample; axial ones enclosed in the metatracheal parenchyma, sometimes also radial ones in the rays.

Differences between the two sections covered by the present paper are hardly known and I expect that they will appear to be very slight. Possibly the scattered wood parenchyma may present a more or less reliable difference, as was postulated by Moll & Janssonius (1918) and by den Berger (1949): almost absent or very little in sect. *Mesopygeum*, small to large quantities in sect. *Laurocerasus*. There are still too few facts to be certain about this.

j. Chemical characters

On the herbarium labels it is repeatedly stated that bark, leaves and/or fruits smell of 'cyanide', 'bitter almonds', or 'benzaldehyde'. The smell of the bark when cut makes it possible to identify a standing forest tree as belonging to *Prunus*.

The smell mentioned is due to the decomposition products (HCN and benzaldehyde) of the cyanogenetic glycosides which are found in all species of *Prunus* that have been studied in this respect. The exact nature, however, of the glycosides is known in only a limited number of species. Up till now have been found: amygdaline in seeds and prunasine in leaves and bark. (A third one, prulaurasine, is racemized prunasine). See Rosenthaler (1919), Dillemann (1958) and Hegnauer (1959) for a more detailed survey.

It is possible that the localization of the glycosides and the quantities in which they occur will appear to be characters of some taxonomic value, but up till now prospects are not promising.

The flavonoid compounds have been subject of some chemotaxonomic investigations. Bate-Smith (1961) published a paper-chromatographical survey of the phenolics of *Prunus* leaves and found in general a good agreement with Rehder's subdivision of the genus. From subgenus *Laurocerasus* he analysed leaves of the two commonly cultivated species *P. laurocerasus* and *P. lusitanica*, and of two Californian species *P. lyonii* and *P. ilicifolia*. His material is therefore too restricted to say anything at all about relationships within the subgenus.

Hasegawa (1958) investigated the flavonoid compounds isolated from heartwood, and found that leucoanthocyanidins, catechins, flavones, and flavanones occur. He too found a fair general agreement with current infrageneric classification. The subgenera *Laurocerasus* and *Padus* seem to be biochemically less complex in containing only one group of main constituents, leucoanthocyanidins in *Laurocerasus* and catechins in *Padus*, flavones and flavanones being present only in trace amounts. The latter compounds, together with catechins, are main constituents in the subgenera *Prunus* and *Cerasus*.

It is evident that still too few species have been investigated thoroughly and the situation is such that chemical characters cannot yet produce additional evidence for a natural system of the genus *Prunus*. All that can be said at present, is that phytochemical observations coincide well with the existing framework based on morphological evidence.

6. DISTRIBUTION

Sect. Laurocerasus

The greatest density of species (see fig. 9) is found in southern China and the parts of other countries (Assam, Burma, Vietnam) which are adjacent to it, in other words:

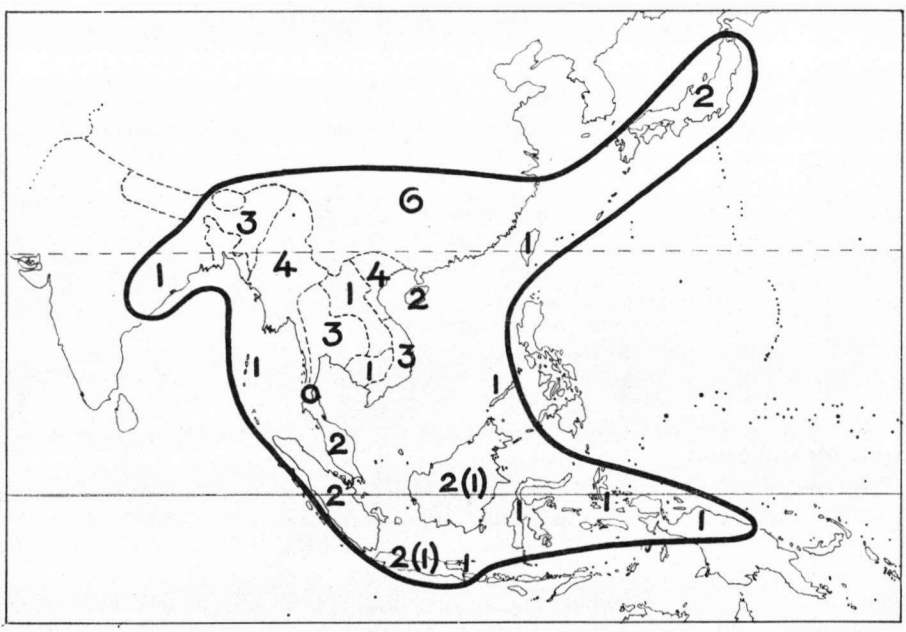

Fig. 9. Generalized area of the Asiatic species of Sect. *Laurocerasus*. In each part of the area is indicated the number of species, in brackets the number of endemics. See fig. 13 for the European and African species of the section.

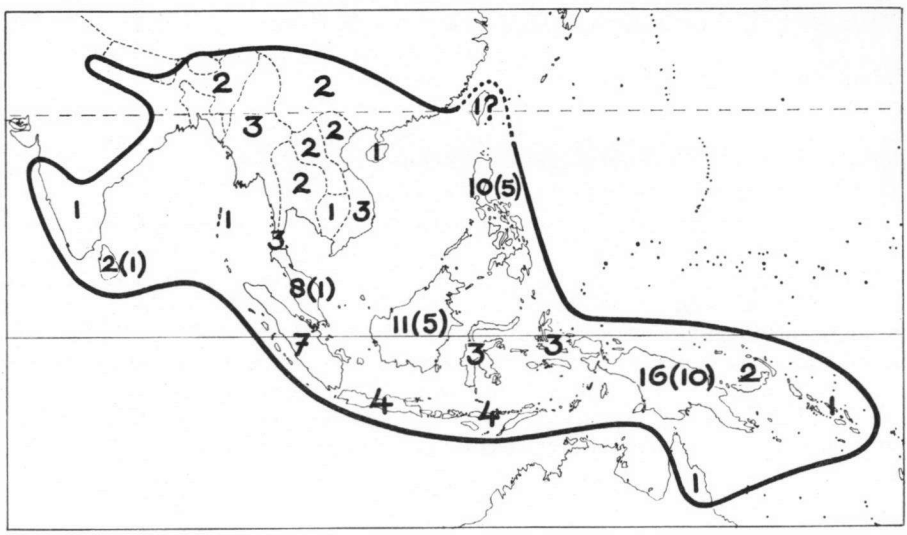

Fig. 10. Generalized area of Sect. *Mesopygeum*. In each part of the area is indicated the number of species and varieties, in brackets the number of endemics. In species which are subdivided into varieties, each variety is counted.

in the region roughly between 20° and 30° N and between 90° and 110° E. Six of the fourteen species occur together here: *P. fordiana, jenkinsii, phaeosticta, spinulosa, wallichii,* and *zippeliana.*

Going considerably outside this distributional centre are, in the first place, the four species not figured in the map, viz. the two African species *(P. africana* which is widely spread over that continent, and *P. crassifolia* which is endemic in Congo), and the two 'European' species *(P. laurocerasus* in the Balkans, Turkey, S. Russia, and N. Persia, and *P. lusitanica* in Portugal and Macaronesia).

Other species extending their area outside the centre, are:
P. pygeoides, in India going west to *c.* 80° E;
P. spinulosa and *zippeliana,* also found in Japan;
P. wallichii, also found in Sumatra and Malaya;
P. javanica, with its main area in Malesia;
and of course the two Malesian endemics *P. adenopoda* (Java) and *P. mirabilis* (Borneo).

Sect. Mesopygeum

This section is predominantly developed in Malesia, as appears from the map (fig. 10). The larger numbers of species are found in
Borneo: 9 species (of which one in 3 varieties), 5 endemics;
Philippines: 9 species (1 in 2 varieties), 5 endemics;
New Guinea: 14 species (of which 2 in 2 varieties each), 8 endemic species (one of which with 2 varieties), and one more endemic variety.

On the Asiatic continent north of the Thai-Burmese Peninsula only 4 species are found *(P. arborea* var. *montana, ceylanica, grisea* var. *tomentosa, lancilimba);* in Ceylon

there is next to the wide-spread *P. ceylanica* also an endemic species: *P. walkeri;* the southern and eastern limits of the area are occupied by *P. turneriana* (Queensland) and *P. schlechteri* (Solomon Islands) respectively.

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8. NOTES ON THE PRESENTATION

Within each section the species have been arranged in an order that (as far as possible in a linear sequence) reflects their supposed relationships.

Synonymy has been given in full, except for herbarium names on sheets, which have not been cited.

All types have been mentioned; many of the binomials had to be lectotypified and in one case a neotype has been designated. The abbreviations of the herbaria are in accordance with Index Herbariorum, 5th ed. (1964).

I have refrained from giving lists of specimens examined. They take up very much space and their value for users of the revision is extremely doubtful. At the end of this paper (p. 108) an 'Identification List' has been added, with the aid of which anyone is able to verify my identification of specimens examined.

Data on the distribution have been given rather precisely, parts of islands and countries being cited in many cases. As a rule the records are based on the fertile specimens only, since identification of sterile specimens is often very doubtful. The area of each species has, moreover, been drawn on small maps between the text.

Under the heading 'Compilation of fieldnotes' I have given the collectors' notes on bark, wood, colour of flower and fruit, uses, vernacular names, *etc.* Too often the data are very scarce, but sometimes a rather complete and reliable picture emerges from the notes on the labels. Vernacular names have been omitted when they were recorded once only, because I am not in a position to judge their reliability.

PRUNUS L.
subg. LAUROCERASUS

(Tourn. *ex* Duh.) Rehd., Manual (1927) 478; *ibid.*, 2nd ed. (1940) 480; Krüssmann, Handb. Laubgeh. 2 (1962) 245. — *Laurocerasus* [Clus., Rar. Plant. Hist. (1601) 4; Tourn., Inst. (1700) 627, t. 403] *ex* Duhamel, Traité Arbres 1 (1755) 345, t. 133; M. J. Roem., Syn. 3 (1847) 89; Schneid., Ill. Handb. Laubholzk. 1 (1906) 645, *pro max. p.*; Komarov *in* Fl. U.R.S.S. 10 (1941) 579; Hutch., Gen. Flow. Pl. 1 (1964) 188. — *Pygeum* Gaertn., De Fruct. 1 (1788) 218. — *Cerasus* sect. II § (subsect.) *Laurocerasi* (Duh.) Ser. *in* DC., Prod. 2 (1825) 540. — *Cerasus* sect. *Laurocerasus* (Duh.) G. Don, Gard. Dict. 2 (1832) 515, *pro parte*. - *Cerasus* subg. *Laurocerasus* (Duh.) Rchb., Nomencl. (1841) 177. — *Prunus* sect. *Nothocerasus* Miq., Fl. Ind. Bat. 1, 1 (1855) 364, *pro parte*. — *Prunus* sect. *Laurocerasus* (Duh.) B. & H., Gen. Plant. 1 (1865) 610; Koehne, Deutsche Dendrol. (1893) 303; Koehne, Bot. Jahrb. 52 (1915) 292. — *Prunus* subsect. *Laurocerasus* (Duh.) Koehne, Verh. Bot. Ver. Brandenb. 52 (1911) 107; Koehne *in* Sarg., Pl. Wilson. 1 (1912) 74. — See also under the synonymy of the sections.

Type species: *Prunus laurocerasus* L. (lectotype).

Evergreen trees or shrubs. *Leaves* entire or incised (dentate, crenate, serrate); usually with some (mostly 2) glands at the base, either on the under-surface of the blade, or in the margin, or on the petiole. *Stipules* small, caducous, usually free, sometimes intrapetiolarly connate. *Inflorescence* a raceme with normally more than 10 flowers, rarely a spike, very rarely a compound raceme; racemes usually solitary in the axils of leaves, of their scars, or of cataphylls, sometimes in bundles (strongly shortened brachyblasts with or without terminal bud); peduncle never with normal leaves. *Bracts* small, caducous, lower ones often empty and tripartite or with tridentate apex; bracteoles very rarely present. *Flowers* usually bisexual, sometimes male with a more or less reduced ovary. *Hypanthium* funnelshaped or campanulate, under the ripening fruit circumscissile and only the basal part persistent. *Perianth* biseriate and then (4—) 5 (—6)-merous, or all perianth segments more or less equal and then commonly more or less than 10. *Stamens* 10—∞. *Fruit* a drupe, ellipsoid to didymous; mesocarp usually dry, sometimes distinctly fleshy; endocarp bony or woody, usually thin; seedcoat sometimes hairy. — See Chapter 5 for a more detailed consideration of the morphology.

Distribution. About 75 species, mainly tropical-Asiatic and tropical-American, one or two species in tropical Africa; in America, Europe and Asia extending into more temperate regions.

Remarks. The first author who put a group of about this circumscription on a subgeneric level in the genus *Prunus*, was Rehder (1927). He ascribed the combination *Prunus* subg. *Laurocerasus* to Koehne, which is not correct. Koehne never considered *Laurocerasus* as a subgenus, but as a section (1893, 1915) or subsection (1911, 1913).

The author of the genus *Laurocerasus* is usually cited as M. J. Roemer (1847), but Duhamel (1755) seems to have been the first one to validate the old name.

The subgenus can be divided into three sections, cf. p. 7, also for a key to the sections. Only the two Old World sections are treated here.

KEY TO THE SPECIES [1])

1. Leaves densely dark-dotted beneath.
   2. Fruits 15 mm or longer, ovoid to ellipsoid. Stipules intrapetiolarly connate, index 2—4.
      3. Petals *c.* 7½ mm long. Fruits with acute base. Leaves without basal glands. *Borneo, 2000—2700 m.* **14. P. mirabilis**
      3. Petals up to 4 mm long. Fruits with rounded base. Basal glands 2, usually on petiole, rarely in the margin. *Burma, Thailand, Vietnam, Andaman Is, Malesia except Philippines, 0—1200* m. **13. P. javanica**
   2. Fruits smaller. Stipules free, index 6—10. Basal glands on lower surface of blade, often very near margin.
      4. Racemes in axils of cataphylls or normal leaves in the basal part of lateral shoots, all bracts bearing flowers. Fruits 0.8—1.1 times as long as wide. *S. China, Taiwan, Hainan, Assam, E. Pakistan, Burma, Thailand, Vietnam, (500—)900—2800* m . . . . . **9. P. phaeosticta**
      4. Racemes axillary, basal bracts empty, hard and dark. Fruits 1.3—1.7 times as long as wide. *SE. China, Hainan, Cambodia, Vietnam, 300—750(—1400) m* . . . . . **10. P. fordiana**
1. Leaves not dark-dotted beneath.
   5. Basal glands on the petiole (not always present on all leaves of the twig).
      6. Leaves entire, petiole ¾—1(—1½) cm. Racemes up to 2½ cm. Fruits 10—13 mm diam., base attenuate, 1½—2 times as long as wide. *Java, 0—500 m.* . . . . . **12. P. adenopoda**
      6. Leaves serrate or dentate, petiole (¾—)1—2 cm. Racemes 1½—6 cm. Fruits 7—10 mm diam., base rounded, (2—)2¼—2¾ times as long as wide. *Japan, S. China, also Vietnam?, 600—3000 m.* **11. P. zippeliana**
   5. Basal glands not on the petiole, or absent.
      7. Leaves serrate, dentate, or crenate, at least towards the apex, sometimes mixed with entire ones.
         8. Fruits transversely ellipsoid or globular.
            9. Ovary glabrous. Racemes 1½—4½ cm, axillary, basal bracts empty. Fruits (depressed-) globose, 7—10 by 8—10 mm. *India, SW. China, 900—1500 m.* . . . **1. P. pygeoides**
            9. Ovary sparsely hairy. Fruits transversely ellipsoid.
               10. Racemes 2—8 cm, in axils of caducous cataphylls at base of shoots that produce normal leaves above the racemes. Hypanthium 1¼—2 mm high, sepals 1—1½ mm long. Fruits 5½—8 by 8½—12 mm. Leaves herbaceous to coriaceous. *Tropical Africa, 600—3000 m.* **2. P. africana**
               10. Racemes up to 1½ cm, axillary. Flowers larger (hypanthium *c.* 3 mm, sepals *c.* 2½ mm). Fruits 11½ by 13 mm. Leaves very stiff and hard. *Congo, 2800—3000 m.* **3. P. crassifolia**
         8. Fruits ellipsoid or ovoid.
            11. Ovary densely to sparsely hairy, sometimes with only a tuft of hairs. Basal glands 2 or more, flat, on the blade, additional glands often many, in 2 rows more or less parallel to the midrib. *Cont. Asia from E. Pakistan and Sikkim to Kwangtung, Sumatra, Malaya, 600—3600 m* . . . . . **7. P. wallichii**
            11. Ovary glabrous.
               12. Fruits 17—22 by 12½—15 mm. *SW. China, Assam, E. Pakistan, Burma, 1000—1800 m.* **6. P. jenkinsii**
               12. Fruits at most 14 mm long, 10 mm wide.
                  13. Racemes during anthesis always distinctly longer than the supporting leaves. *Portugal, Madeira, Canary Is, 600—800 m?* . . . . . **4. P. lusitanica**
                  13. Racemes during anthesis shorter than the supporting leaves, rarely about as long.
                     14. Rachis and pedicels glabrous. Largest leaf rarely shorter than 10 cm (when shorter, then leaf-index more than 4). Basal glands 2—4(—6), flat, rather large, usually near midrib, rarely absent. *SE. Europe, Turkey, N. Persia, 0—2400 m?* **5. P. laurocerasus**

[1]) To be noted before using the key:

1. As a rule, flowers as well as fruits are needed for identification.
2. Many species with fascicled racemes have sometimes (or often, or always) also solitary ones.
3. When judging the indumentum of the ovary, do not consider the hairs which may be present on the bottom of the hypanthium around the insertion of the ovary. When removing the ovary, these hairs remain on the hypanthium.
4. When judging the indumentum of the seed, remember that sometimes there are hairs only or mainly near the hilum. Such seeds are in the key accepted as hairy.

14. Rachis and pedicels sparsely pubescent. Largest leaf rarely longer than 9 cm. Basal glands in the margin or very near it on the blade, sometimes absent. *Japan, S. China, 400—1200 m.* . . . . . **8. P. spinulosa**

7. Leaves quite entire.
15. Basal leaf-glands distinctly and deeply hollowed.
16. Fruits ellipsoid to ovoid.
17. Fruits 6—8 mm diam. Stamens up to 20(—32). Leaves 4—10(—13) cm long. *Borneo, 1400—3200 m.* . . . . . **45. P. oocarpa**
17. Fruits 14—17 mm diam. Stamens 25—55. Leaves 10—18(—23) cm long. *Philippines, 600—2100 m.* . . . . . **29. P. fragrans**
16. Fruits globular to transversely ellipsoid.
18. Racemes in bundles, or compound.
19. Fruits 13—21 by 17—27 mm. Stamens 50—85. Racemes 3½—11 cm. *Sumatra, Malaya, 0—600 m.* . . . . . **41. P. polystachya**
19. Fruits up to 10 mm long, up to 15 mm wide. Stamens up to 50. Racemes rarely longer than 5 cm.
20. Basal glands not in blade proper, but in contracted leaf-base.
21. Leaves ovate, with 5—9 pairs of nerves, petiole up to 2 cm. Ovary densely hairy. *Thailand, Sumatra, Malaya, Borneo, 150—2000 m.* **43e. P. arborea** var. **densa**
21. Leaves elliptic to oblong, with 8—12 pairs of nerves, petiole up to 1 cm. Ovary sparsely hairy (or glabrous?). *Borneo, sea-level.* **42. P. turfosa**
20. Basal glands in the blade itself. *Cont. Asia, 0—2000 m.* **43d. P. arborea** var. **montana**
18. Racemes solitary and simple.
22. Stamens 60—75. Fruits up to 17 mm long. *Philippines, c. 1200 m.* **28. P. rubiginosa**
22. Stamens up to 40.
23. Nerves 5—8 pairs. Stipules free. Fruits 6—11½ (—13) by 7½—13(—15½) mm. *Philippines, 0—2000 m.* . . . . . **27. P. marsupialis**
23. Nerves 9—15 pairs. Stipules keeled inside and intrapetiolarly connate with their keels. Fruits 13—14 by 14—17(—20) mm. *Celebes, Philippines, 0—1500 m.* **26. P. clementis**
15. Basal glands flat or only slightly hollowed, or in all leaves absent. (See also *41. P. polystachya*, in which the glands may rarely be only slightly hollowed).
24. Racemes in bundles (short shoots, with or without terminal bud) or compound.
25. Fruits ellipsoid or (ob)ovoid.
26. Petals clearly distinct from sepals, 3—8 times as long as the latter. *Cont. Asia, Sumatra, Malaya, 600—3600 m.* . . . . . **7. P. wallichii**
26. Petals about as long as sepals, or not distinguishable from them.
27. Fruits up to 11 by 8 mm. *Borneo, 1400—3200 m.* . . **45. P. oocarpa**
27. Fruits at least 15 mm long, 10 mm wide.
28. Stamens 50—70. Nerves 12—15 pairs. *Malaya, c. 1200 m.* **46. P. malayana**
28. Stamens 15—25. Nerves 5—8 pairs. *S. China, Burma, Vietnam, 1200—2800 m.* . . . . . **44. P. lancilimba**
25. Fruits globular to transversely ellipsoid.
29. Fruits more than 25 mm wide. *New Guinea, sea-level* . **48. P. versteeghii**
29. Fruits up to 20 mm wide.
30. Leaves without basal glands, stipules with a large, hollowed gland. *Borneo, 0—600 m.* . . . . . **47. P. beccarii**
30. Leaves usually with basal glands, stipules not with a hollowed gland (but sometimes with one or some flat or crateriform glands outside).
31. Fruits more than 2 cm long. Stipules intrapetiolarly connate. *Malaya, c. 1200 m.* . . . . . **46. P. malayana**
31. Fruits up to 12 mm long. Stipules never connate. *Cont. Asia, Malesia, 0—3200 m.* . . . . . **43. P. arborea**
24. Racemes solitary and simple.
32. Seedcoat glabrous.
33. Ovary distinctly and densely hairy.
34. Fruits up to 12 mm wide.

35. Fruits ellipsoid or ovoid, more long than wide.
36. Petals distinct from sepals, 3—8 times as long as the latter. *Cont. Asia, Sumatra, Malaya, 600—3600 m.*. . . . . **7. P. wallichii**
36. Perianth segments subequal.
37. Leaves with usually acute base and 5—8 pairs of nerves, basal glands absent or 1—2 small and inconspicuous ones. Racemes up to 1 cm. Fruits 11—12 by 8—11 mm. *New Guinea, 1900—2900 m.* **37. P. oligantha**
37. Leaves with rounded to cordate base and 7—11 pairs of nerves, basal glands usually 2 (rarely 3 or 4), distinct, usually slightly bulging above. Racemes up to 3(—5) cm. Fruits 8—11 by 6—8 mm. *Borneo, 1400—3200 m.* . . . . . **45. P. oocarpa**
35. Fruits globular to transversely ellipsoid, more wide than long.
38. Twigs and leaves pubescent when young, but rapidly glabrescent and on mature leaves hardly any hairs left.
39. Flowers (sub)sessile, pedicels not exceeding 1 mm. *Sumatra, Malaya, 800—1200? m.* . . . . . **20. P. glabrifolia**
39. Pedicels 1—7 mm. *Java, East Malesia, Taiwan? 0—3000 m.* **17a. P. grisea** var. **grisea**
(See also *17b. P. grisea* var. *tomentosa* from Cont. Asia and West Malesia, in which by exception the ovary may be rather densely hairy, and which is usually easily recognized by its papyraceous leaves.)
38. Twigs and leaves densely pubescent when young, tardily glabrescent, mature leaves always still pubescent, although sometimes only sparsely so.
40. Leaves elliptic to oblong, 2½—11 by 1½—5 cm, index 1½—2½, rather thick and stiff, apex usually rounded, often retuse, nerves 5—9 pairs. Pedicels 0—7 mm. *New Guinea, 1800—3700 m.* **38. P. pullei**
40. Leaves oblong to lanceolate, 6—18 by 2½—6½ cm, index 2½—4, herbaceous, apex long-tapering or acuminate, nerves 6—12 pairs. Pedicel 0—1 mm. *Borneo, Philippines, 1200—1500 m.* **24. P. spicata**

34. Fruits more than 12 mm wide.
41. Fruits more than 20 mm wide.
42. Perianth segments 6—10, subequal, stamens 12—17. *Ceylon, 500—900 m.* . . . . . **16. P. walkeri**
42. Perianth biseriate, stamens 40—45. *New Guinea, sea-level.* **38. P. versteeghii**
41. Fruits up to 20 mm wide.
43. Racemes not longer than 2½ cm during anthesis.
44. Fruits subglobular to ellipsoid, with a usually distinct beak of 1—4 mm, without beak 14—22 by 14—18 mm. Leaves glabrous, venation almost invisible beneath and also nerves not prominent. *Sumatra, Malaya, Borneo, 0—750 m.*. . . . . **21. P. lamponga**
44. Fruits not beaked. Leaves with prominent nerves and visible venation beneath.
45. Fruits not more than 13 mm long. *Java, East Malesia, Taiwan?, 0—3000* m . . . . **17a. P. grisea** var. **grisea**
45. Fruits at least 15 mm long. *Philippines, 2700 m* **40. P. subglabra**
43. Racemes 3 cm or longer.
46. Flowers during anthesis distinctly pedicelled, pedicel at least 1 mm long.
47. Stipules keeled inside and with basal parts of keels intrapetiolarly connate. *Philippines, Celebes, 0—1050 m.* **26. P. clementis**
47. Stipules free.
48. Perianth distinctly biseriate, 4-merous. *Borneo, 1000—1800 m.*. . . . . **25. P. laxinervis**

48. Perianth segments 6—13, subequal or at least not regular. *Java, East Malesia, Taiwan?, 0—3000 m.*
17a. P. grisea var. grisea

46. Flowers sessile or pedicel less than 1 mm.
49. Fruits subglobular, 10—12½ by 11—13 mm, whole pericarp not more than ½ mm thick. *Borneo, Philippines, 1200—1500 m.*
24. P. spicata

49. Fruits globular, 14—18 mm diam., mesocarp *c.* 1 mm thick, endocarp *c.* ½ mm. *Philippines, 1000—1200 m.*
23. P. pulgarensis

(See also *33. P. schlechteri* from New Guinea and the Solomon Is, in which the seedcoat may appear glabrous, but has at least some hairs near the hilum).

33. Ovary glabrous or with some few hairs.
50. Petals distinct from sepals, 2—8 times as long as the latter.
51. Fruits transversely ellipsoid. *Lesser Sunda Is, Moluccas, 0—1700* m.
39. P. wallaceana

51. Fruits ellipsoid or ovoid.
52. Ovary with a tuft of hairs. *Cont. Asia, Sumatra, Malaya, 600—3600 m*
7. P. wallichii

52. Ovary entirely glabrous.
53. Fruits 19—22 by 10—13 mm. *Java, 0—500 m.* **12. P. adenopoda**
53. Fruits not more than 14 mm long.
54. Rachis and pedicels glabrous. Largest leaf rarely shorter than 10 cm, basal glands 2—4(—6), flat, usually near midrib. *SE. Europe, Turkey, N. Persia, 0—2400 m?*
5. P. laurocerasus

54. Rachis and pedicels sparsely pubescent. Largest leaf rarely longer than 9 cm, basal glands in the margin or very near it. *Japan, S. China, 400—1200 m.* . . . **8. P. spinulosa**

50. Perianth segments subequal, or when distinct in shape, then petals only up to 1½ times as long as sepals.
55. Perianth segments subequal, or sepals and petals distinct, but then fruits less than 12 mm wide, and leaves with 5—9 pairs of nerves.
56. Fruits up to 13 mm long, usually much smaller, globular to transversely ellipsoid, 1—1¾ times as wide as long.
57. Leaves still distinctly pubescent beneath when mature. *New Guinea, 2100—3100 m.* . . . . . **22. P. sclerophylla**
57. Leaves pubescent when young, but glabrous or almost so when mature. *Cont. SE. Asia, Malesia, 0—3500 m.* . **17. P. grisea**

56. Fruits 14 mm long or more, subglobular to ellipsoid or ovoid, 1—1¾ times as long as wide.
58. All bracts tripartite, 3½—5 mm long. *S. China, Burma, Vietnam, 1200—2800 m.* . . . . . **44. P. lancilimba**
58. Lowermost, empty bracts sometimes with tridentate apex, flower-bearing ones always entire, up to 3 mm long.
59. Fruits beaked, beak 1—4 mm. Flowers subsessile or shortly (—2 mm) pedicelled, small (hypanthium up to 2½ mm high). Basal leaf-glands usually 2(—4), small, in corner. *Sumatra, Malaya, Borneo, 0—750 m.* . . . . . **21. P. lamponga**
59. Fruits not beaked. Flowers up to 6 mm long pedicelled, larger (hypanthium 2½—3 mm high). Basal glands 3—6, large, not in corner but to rather high up in the leaf. *Borneo, 1600—2100 m.* . . . . . **19. P. kinabaluensis**

55. Perianth distinctly differentiated as sepals and petals. Fruits more than 10 mm wide.
60. Flowers small, hypanthium 1½—2 mm high. Leaf with 5—9 pairs of nerves. *Cont. Asia, 0—2100 m.* . . . . . **15. P. ceylanica**
60. Flowers larger, hypanthium 2—3 mm high. Nerves 7—14 pairs.
61. Stamens 35—55. Fruits 11—13 mm long. *Lesser Sunda Is, Moluccas, 0—1700 m.* . . . . . **39. P. wallaceana**

61. Stamens 10—30.
62. Racemes (4—)8—15 cm. Pedicels 1½—5 mm. Anthers ¾—1½ mm long. Fruits 8—11 mm long. *New Guinea, Bismarck Arch., 0—1600 m.*. . . . **30. P. dolichobotrys**
62. Racemes 1½—3 cm Pedicels 0—1 mm. Anthers ¼—½ mm long. Fruits 9—11 mm long. *New Guinea, 0—450 m.* **18. P. brachystachya**

32. Seedcoat hairy.
63. Ovary glabrous.
64. Stipules often intrapetiolarly connate with the basal parts of their keels. Leaves 10—20(—25) by 6—11(—14) cm, pubescent when young, more or less glabrescent but nearly always at least the midrib remaining hairy, nerves prominent beneath, venation rather prominent. Hypanthium densely pubescent outside, anthers 1—1½ mm long. *New Guinea, Bismarck Arch., 0—1600 m.* **31. P. gazelle-peninsulae**
64. Stipules free. Leaves 4½—13(—16) by 2½—7 cm, glabrous (very sparsely puberulous beneath when very young only), nerves and veins more or less flat and inconspicuous beneath. Hypanthium glabrous or sparsely pubescent outside, anthers ½—1 mm long. *New Guinea, 1500—3700 m.* **32. P. costata**
63. Ovary densely hairy.
65. Fruits longer than 16 mm, endocarp ¾—1 mm thick, woody.
66. Stipules 10—12 by 7—10 mm. Mature leaves still more or less densely pubescent beneath and on midrib above. Anthers 1—1½ mm long. Fruits 24—33 by 24—34 mm. *New Guinea, 600—2300 m.* **34. P. glomerata**
66. Stipules 4—7 by 1—3 mm. Mature leaves only sparsely pubescent on the nerves beneath, (sub)glabrous above. Anthers ½—¾ mm long. Fruits 17—27 by 18—27 mm. *New Guinea, Australia, 300—800 m.* **35. P. turneriana**
65. Fruits not longer than 16 mm, endocarp thin, not more than ½ mm.
67. Fruits 6—7½ by 7—9 mm. Leaves 4—8½ by 2—3½ cm, apex obtuse and retuse. *New Guinea, 2000—2300 m.* . . . . . **36. P. brassii**
67. Fruits at least 9 mm long and 10 mm wide. Leaves often larger, apex acute or acuminate. *New Guinea, Solomon Is, 0—2500 m.* **33. P. schlechteri**

Sect. **Laurocerasus**

Prunus sect. *Laurocerasus* Miq., Fl. Ind. Bat. 1, 1 (1855) 366. — *Prunus* sect. *Nothocerasus* Miq., Fl. Ind. Bat. 1, 1 (1855) 364, *pro min. parte, lectotypo incl.* — *Prunus* sect. *Pygeopsis* Kurz, J. As. Soc. Beng. 45, 2 (1877) 302. — *Pygeum* sect. *Archopygeum* Koehne, Bot. Jahrb. 51 (1913) 214. — *Prunus* subsect. *Malacocraspedon* Koehne, Bot. Jahrb. 52 (1915) 294, 295. — *Prunus* subsect. *Sclerocraspedon* Koehne, Bot. Jahrb. 52 (1915) 295, 299. — *Prunus* subsect. *Mesocraspedon* Koehne, Bot. Jahrb. 52 (1915) 295, 301, *pro min. parte, spec. Amer. excl.* — Furthermore the synonyms mentioned under the subgenus (p. 25) except *Pygeum* Gaertn.

Typification. *Prunus* sect. *Nothocerasus:* Miquel's section contains a mixture of species, now placed in subgenus *Padus (nepaulensis, undulata, capuli)*, sect. *Laurocerasus sensu mihi (sundaica, javanica, junghuhniana)*, the American section *(samydoides, schiedeana, brasiliensis)*, and sect. *Mesopygeum sensu mihi (ceylanica)*. Miquel's description does not strikingly conform to any one of those different groups, but has been inspired mostly by *P. javanica* and *P. junghuhniana*. Consequently I herewith typify the sectional name by *P. javanica*.

Prunus sect. *Pygeopsis:* two species mentioned, *P. javanica* and *P. martabanica*, the latter a heterotypic synonym of the former.

Pygeum sect. *Archopygeum: P. africanum* is the only species mentioned.

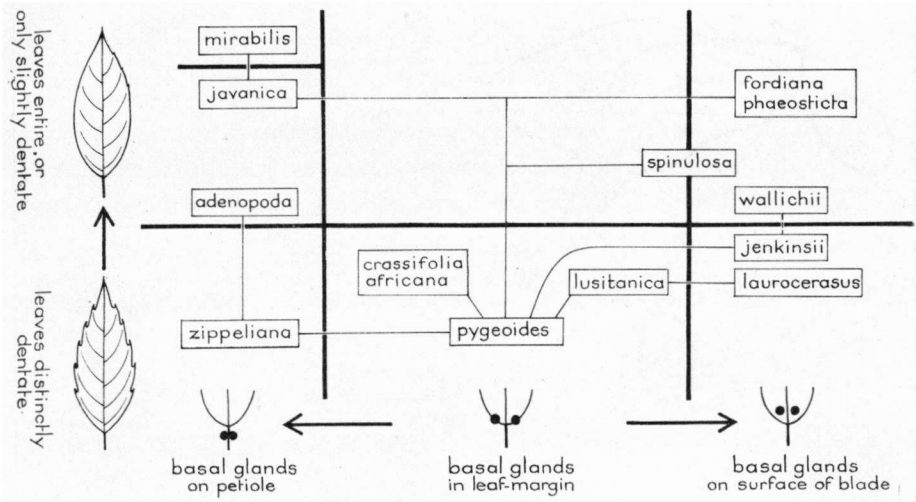

Fig. 11. Relationships in Section *Laurocerasus*. The large arrows at the bottom and on the left of the figure indicate the supposed direction of the semophyletic development of two characters: the place of the basal leaf-glands, and the incisions of the leaf-margin. (In *P. mirabilis* there are no basal glands).

Prunus subsect. *Malacocraspedon* and subsect. *Sclerocraspedon:* not typified by Koehne, consisting of 9 and 7 species respectively, all belonging to the present section.

Prunus subsect. *Mesocraspedon:* not typified by Koehne, the majority of the species belongs to my 'American section'. To the five not-American species belongs *P. laurocerasus.*

Trees or shrubs. *Buds* in several species protected by perulae. *Leaves* entire or incised; basal glands either flat and on under-surface, or flat to more or less cushion-shaped and in the margin, or on the petiole, additional glands rarely present. *Racemes* usually solitary, only rarely (sometimes in *wallichii* and *zippeliana)* in bundles. *Flowers* with a biseriate, usually regularly 5-merous perianth, petals in shape, texture, and dimensions distinct from sepals, (1¼—)2—8 times as long as the latter. *Stamens* 10—50. *Ovary* usually glabrous (more or less hairy in *africana, crassifolia, wallichii,* rarely so in *phaeosticta). Fruits* usually longer than wide, ellipsoid or ovoid, sometimes (sub)globular, rarely *(africana, crassifolia,* sometimes in *phaeosticta)* transversely ellipsoid; seedcoat nearly always glabrous (sometimes hairy in *africana).*

Distribution. 14 species, most of them tropical (Africa and Asia from eastern India to New Guinea) but several in subtropical and cool-temperate regions (Macaronesia, Portugal, SE. Europe, N. Persia, Japan, China). — Fig. 9.

Ecology. In forests and more open vegetation, from sea-level up to 3000(—3600) m.

Remarks. The relationships within the section are visualized in the diagram of fig. 11. My ideas about semophylesis of leaf-margin and basal glands, set forth in chapter 5 (see p. 15), have been incorporated and consequently the diagram is not strictly based on morphological similarity but includes phylogenetical interpretation.

1. Prunus pygeoides Koehne, Bot. Jahrb. 52 (1915) 297. — *Pygeum andersonii* Hook. *f.*, Fl. Brit. Ind. 2 (1878) 320 *('andersoni');* Chatterjee, J. Ind. Bot. Soc. 27 (1948) 9. — *Pygeum lucidum* Anders. *ex* Prain, Beng. Pl. 1 (1903) 464, *nom. superfl.;* Anders., J. As.

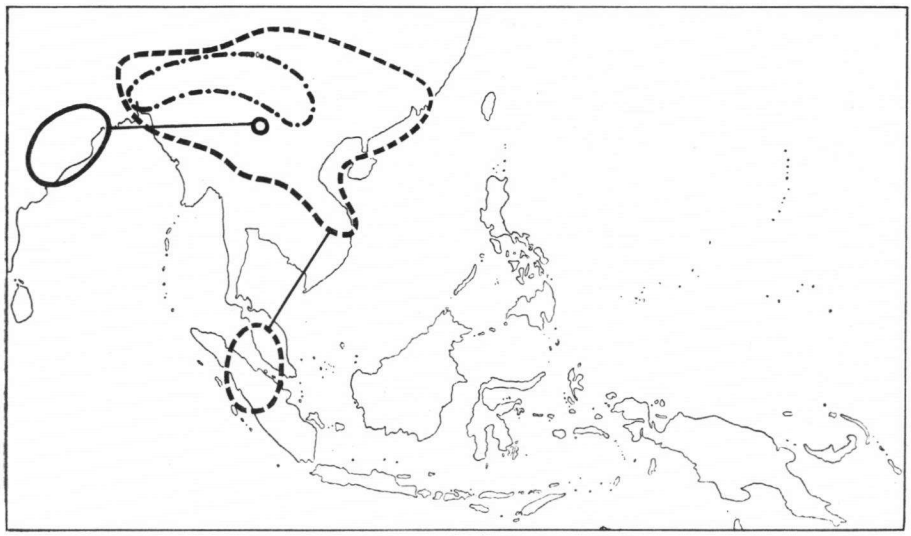

Fig. 12. Distribution of 1. *P. pygeoides* (——— and O), 6. *P. jenkinsii* (—.—.—), 7. *P. wallichii* (— — —).

Soc. Beng. 32 (1863) 203, *nomen;* Haines, For. Fl. Chota Nagpur (1910) 283 *(non vidi).* — *Prunus semiarmillata* Koehne, Bot. Jahrb. 52 (1915) 303. — *Pygeum mooneyi* Raizada, Ind. For. 68 (1942) 421, pl. 24.

Typification. *Prunus pygeoides, Pygeum andersonii, Pygeum lucidum: Anderson s.n.* from Mt Paresnath, holotype in K *(non vidi)*, isotypes seen from BM, CAL, DD, L.

Prunus semiarmillata: Henry 12887, holotype lost in B?, isotypes seen from E, K.

Pygeum mooneyi: Mooney 1551a, holotype in DD *(non vidi)*, isotype seen from K; paratypes: *Mooney 904* (DD), *Mooney 1551* (DD).

Small tree, up to 6 m, glabrous except flowers. *Twigs* at base with *c.* 3 tripartite cataphylls *c.* 2½ by 2½ mm. *Leaves* oblong to ovate-oblong, 6—16 by 2½—5½ cm, index 2½—3¼, base acute, rarely more rounded, apex acute or acuminate, margin glandular-serrate to -crenate, coriaceous; nerves 8—12 pairs, only slightly prominent on either surface, venation practically invisible; basal glands (0—)1—3, in the margin below the lowest teeth, cushion-shaped or flat and slightly sunken (see fig. 7 b); petiole ¾—1½ cm. *Stipules* 1½—2½ by ½—1 mm, index 2—5, caducous. *Racemes* solitary, axillary, 1½—4½ cm; peduncle up to ½ cm. *Bracts* up to 2 mm long, basal ones sterile and often with tridentate apex; bracteoles present at base of pedicel, *c.* ¾ mm long. *Pedicels* 2—4 mm. *Hypanthium* 1—1½ mm high, glabrous outside, inside glabrous or with some hairs. *Perianth* regularly 5-merous; sepals triangular, 1—1½ mm long, glabrous or slightly ciliate; petals elliptic, 1½—2 mm long, 1¼—1½ times as long as sepals, sparsely hairy and ciliate. *Stamens c.* 25—30; filaments up to 2½ mm, glabrous; anthers ½—¾ mm long. *Ovary* glabrous; style up to 1½ mm, glabrous. *Fruits* (few seen) globular to depressed globular, 7—10 by 8—10 mm, glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. India (Madhya Pradesh, Bihar, Orissa), China (Yunnan). — Fig. 12.

Ecology. 900—1500 m alt., several collections from ravines.

Field-notes. Few available. Ripe fruits purple-black.

Remarks. As to its relationships this species more or less occupies a central position in the section, cf. fig. 11.

It resembles most closely *P. africana*, from which it differs *i.a.* in the position of the racemes, see there, p. 34.

The oldest epithet *andersonii* is not available in *Prunus* because of *P. andersonii* Gray (1868).

2. Prunus africana (Hook. *f.*) Kalkm., *comb. nov.* — *Pygeum africanum* Hook. *f.*, J. Proc. Linn. Soc. Bot. 7 (1864) 191; Sim, For. Fl. Cape Col. (1907) 215, pl. 63; Koehne, Bot. Jahrb. 51 (1913) 179, 223; Engler, Veg. d. Erde IX, iii, i (1915) 302, fig. 192; Lebrun, Publ. Inst. Nat. Et. Agron. Congo Belge 1 (1935) 86, *pro p.*; Hauman *in* Fl. Congo Belge 3 (1952) 32; Keay *in* Hutch. & Dalz., Fl. W. Trop. Afr. 2nd ed. 1 (1958) 426; Graham *in* Fl. Trop. E. Afr., fam. Rosac. (1960) 45, fig. 6. — *Pygeum crassifolium* Haum., Bull. Jard. Bot. Brux. 22 (1952) 93, *p. min. p., typo excl.*

Typification. *Prunus africana, Pygeum africanum:* lectotype chosen by Graham: *Mann 1207*, holotype in K, no isotypes seen.

Pygeum crassifolium, see under *P. crassifolia*, p. 34.

Small to big tree, 3—40 m, sometimes a large shrub, entirely glabrous except for the flowers. *Cataphylls* at base of shoots not functioning as bud-scales. *Leaves* elliptic to oblong, sometimes ovatish, (4—)6—15 by 2—5½ cm, index (1½—)2—3, base acute, rarely rounded, apex usually acuminate, margin finely to coarsely crenate, dark glandular-pointed in the incisions, herbaceous to coriaceous; nerves 9—12(—15) pairs, more or less flat above, little prominent beneath, venation visible, but not prominent; lowermost marginal glands sometimes larger (fig. 7 a); petiole 1—2 cm. *Stipules* 2—2½ by 0.3—0.4 mm, index 6—8, caducous. *Racemes* solitary, in axils of caducous cataphylls at base of branches which in their upper part usually produce normal leaves too, 2—8 cm; peduncle ½—1 cm, sometimes longer. *Bracts* up to 1 mm long, caducous, all bearing flowers. *Pedicels* 2—5(—10) mm. *Hypanthium* 1¼—2 mm high, glabrous outside, hairy inside, especially in lower half. *Perianth* (fig. 1 e) usually regularly 5-merous and biseriate, rarely 4- or 6-merous, sometimes irregular (supernumerary sepals, missing petals, transitions between petal and stamen); sepals triangular, 1—1½(—1¾) mm long, glabrous except ciliate apex; petals elliptic to oblong, up to 2 mm long, 1.2—1.6 times as long as sepals, hairy outside, at least near margins, sometimes also inside. *Stamens* 24—35; filaments up to 1½(—2½) mm, glabrous; anthers ½—1 mm long. *Ovary* sparsely long-hairy; style up to 1½ mm, sparsely hairy, often denser so just below the stigma. *Fruits* (fig. 6 c) transversely ellipsoid, 5½—8 by 8½—12 mm, 1.4—1.6 times as wide as long, glabrous or still with some hairs; endocarp glabrous; seedcoat glabrous or with some few hairs.

Distribution. Tropical Africa: Ivory Coast, Cameroun, Fernando Po, San Thomé, S. Sudan (?), Ethiopia, Congo, Uganda, Kenya, Tanganyika, Angola, Zambia, Malawi, Rhodesia, S. Africa, Madagascar, Grande Comore. — Fig. 13.

Ecology. Montane forest, often riverine, but also as single trees in grassland, (600—)1000—2500(—3000) m alt. According to Graham also on termite-hills in *Brachystegia* woodland.

Compilation of field-notes. Bark usually reported as dark brown to blackish, tough, resinous, peeling. Sapwood white, heartwood (dark) red, heavy. The young leaves (the flush) and the petioles and midribs of mature leaves are reddish. Flowers usually reported as white or yellowish, some more extensive notes give following picture: hypanthium green outside, paler inside, sepals greenish, petals (creamy) white, reflexed, filaments white, anthers cream-coloured, ovary and style green, stigma yellowish. The fruits are red when ripe. *Uses:* several times noted as medicine (purgative for cattle,

inhalent for fever, for stomach aches). Graham noted also 'poison for arrows'. The timber seems to be of reasonable quality. *Vernaculars:* nearly all names only noted once. *Mumba* (Kinya-runda) appears to be a reliable name.

Remarks. P. africana is closely related to *P. pygeoides* from continental tropical Asia; it differs *i.a.* in having the racemes not placed in axils of normal leaves, but axillary to cataphylls, and in having no empty bracts at the raceme-base.

For the relation to *P. crassifolia* see below.

3. Prunus crassifolia (Haum.) Kalkm., *comb. nov.* — *Pygeum crassifolium* Hauman, Bull. Jard. Bot. Brux. 22 (1952) 93; Hauman *in* Fl. Congo Belge 3 (1952) 33.

Typification. Lectotype: *Bequaert 4500*, holotype in BR, no isotypes seen. Syntypes: *Chapin 416* (BR), *Humbert 8040* (BR), *Stolz 2279* (BM, BR, K), but see under Remarks.

Tree, up to 18 m, entirely glabrous except in the flowers. *Bud* probably protected by perulae, but these not seen. *Leaves* elliptic, 6—10½ by 2½—4½ cm, index 2—2½, base acute to rounded, apex acute (to acuminate?), margin crenate-serrate, with dark glandular points, very stiff and hard; nerves *c.* 10—12 pairs, impressed above, prominent beneath, venation impressed above, rather prominent beneath; on each side the lower 1—2 marginal glands larger and more cushion-shaped; petiole ½—1¼ cm. *Stipules* not seen. *Racemes* solitary, axillary, very short, up to 1½ cm?; peduncle practically 0. *Bracts* not seen. *Pedicels c.* 3 mm long?. *Hypanthium* 3 mm high, glabrous outside, only some long hairs on bottom inside. *Perianth* regularly 5-merous; sepals triangular, *c.* 2½ mm long, glabrous; petals elliptic, *c.* 3 mm long, densely hairy. *Stamens c.* 25—30; filaments up to 1½ mm; anthers *c.* 1 mm long. *Ovary* with some few hairs; style up to 3 mm, glabrous. *Fruits* transversely ellipsoid, 11½ by 13 mm, glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. Congo (Kivu Distr.). — Fig. 13.

Ecology. 2800—3000 m alt.

Field-notes. Few collections. Flowers white, fruits probably purplish when ripe.

Remarks. I agree with what Graham noted about this species in Fl. Trop. E. Afr. (1960). Only *Bequaert 4500* (chosen as the lectotype) is distinctly different from *P. africana*, two other specimens seen by me *(Chapin 416, Humbert 8040)* are probably (but not certainly) conspecific with the type, the fourth specimen cited by Hauman *(Stolz 2279)* is certainly nothing else than *P. africana*. It is surprising that Hauman did not describe the fruits although there are some detached ones present on the Brussels sheet of the type. The fruits indeed do present the most striking difference with *africana*, in which species they are much smaller.

The species remains for the time being a somewhat dubious entity, but in my opinion specific status will most probably appear to be warranted, if and when more material becomes available.

4. Prunus lusitanica L., Sp. Pl. (1753) 473, *excl. hab.* '*Pensylvania*'; Willd., Enum. Pl. Hort. Berol. (1809) 517; Dietr., Syn. 3 (1843) 43; Aschers. & Graebn., Syn. Mitteleur. Fl. 6, 2 (1907) 164; Koehne, Bot. Jahrb. 52 (1915) 302, *incl.* var. *hixa* (Willd.) Koehne, l.c. p. 303; Hegi, Ill. Fl. M. Eur. IV, 2 (1923) 1063; Coutinho, Fl. Port. 2nd ed. (1939) 370; Chittenden, Dict. Gard. 3 (1951) 1698; Boom, Nederl. Dendrol. (1959) 246; Krüssmann, Handb. Laubgeh. 2 (1962) 261. — *Padus lusitanica* (L.) Mill., Gard. Dict. ed. 8 (1768) unpaged. — *Padus eglandulosa* Moench, Meth. Plant. (1794) 672, *nom. superfl., illeg.* — *Prunus sempervirens* Salisb., Prod. (1796) 356, *nom. superfl., illeg.* — *Prunus multiglandulosa* Cav., Anal. Cienc. Nat. Madrid 3 (1801) 59, *non vidi.* — *Prunus hixa* Brouss. *ex* Willd.,

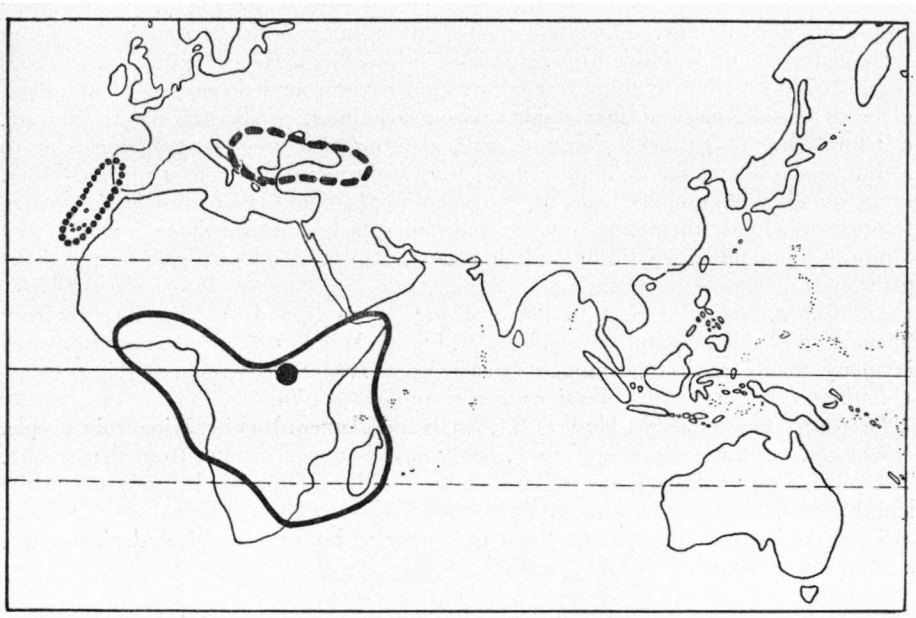

Fig. 13. Distribution of 2. *P. africana* (————), 3. *P. crassifolia* (●), 4. *P. lusitanica* (. . . . . .), 5. *P. laurocerasus* (— — — —).

Enum. Pl. Hort. Berol. (1809) 517. — *Cerasus lusitanica* (L.) Lois., Nouv. Duh. 5 (1812) 5, *non vidi;* Ser. *in* DC., Prod. 2 (1825) 540; Spach, Hist. Nat. Vég. 1 (1834) 418; Lowe, Man. Fl. Madeira 1 (1868) 236. — *Cerasus lusitanica* (L.) Lois. var. *hixa* (Willd.) Ser. *in* DC., Prod. 2 (1825) 540; Lowe, l.c. p. 236. — *Cerasus hixa* (Willd.) C. Sm. *ex* Spach, Hist. Nat. Vég. 1 (1834) 419. — *Laurocerasus lusitanica* (L.) M. J. Roem., Synops. 3 (1847) 92. — *Laurocerasus hixa* (Willd.) M. J. Roem., Synops. 3 (1847) 92. — *Laurocerasus multiglandulosa* (Cav.) M. J. Roem., Synops. 3 (1847) 92.

Typification. *Prunus lusitanica, Padus lusitanica, Cerasus lusitanica, Laurocerasus lusitanica, Padus eglandulosa, Prunus sempervirens:* lectotype: *Linnaean Herbarium sheet nr. 640.7* (LINN, only microfiche seen).

Prunus multiglandulosa, Laurocerasus multiglandulosa: type unknown to me.

Prunus hixa, Cerasus lusitanica var. *hixa, Cerasus hixa, Laurocerasus hixa, Prunus lusitanica* var. *hixa:* probably a *Broussonet* specimen from Teneriffa *(non vidi).*

Small tree or shrub. *Twigs* glabrous. *Buds* protected by about 6 or some more perulae 2—6 mm long, upwards increasing in length, not in width, with tridentate apex, glabrous, hard-leathery. *Leaves* elliptic to oblong, rarely ovatish, (5—)7—12 by 2½—5 cm, index 2—3, base rounded or more acute, apex gradually narrowing to a blunt tip or slightly acuminate, margin dentate or crenate except at base, glabrous, rather thick-coriaceous; nerves 8—11 pairs, not conspicuous above, only slightly prominent beneath, venation not visible; basal glands absent, but sometimes the lowermost tooth-glands slightly larger; petiole 1¼—2 cm, glabrous. *Stipules* 7½—13½ by 1½—2½ mm, index 5—9, glabrous outside, sparsely hairy inside, marginal glands present but usually not conspicuous. *Racemes* solitary, axillary, 11—26 cm, longer than the supporting leaf; peduncle 1—4½ cm;

rachis glabrous. *Bracts* caducous, not seen, those at base of raceme (*c.* 6?) obviously empty and budscale-like. *Pedicels* (4—)6—12(—18) mm, glabrous. *Hypanthium* 2—3 mm high, glabrous outside, inside hairy, especially in lower half. *Perianth* regularly 5-merous (irregularities occasionally found); sepals triangular with rounded apex, 1—1½ mm long, glabrous outside, hairy at apex inside, margin glandular; petals orbicular to obovate, *c.* 4 mm long, 3—4 times as long as sepals, glabrous. *Stamens* 18—25; filaments up to 4 mm, glabrous; anthers *c.* 1 mm long. *Ovary* glabrous; style up to 4 mm, glabrous. *Fruits* ovoid, with rounded base and acute apex, 7½—9 by 5½—6 mm *in sicco*, when fully ripe obviously the mesocarp fleshy and rather thick, and then the fruit up to 10 by 8 mm *in sicco* (and larger still in the living state), glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. Native of N. & C. Portugal, the Canary Is, and Madeira. Reports from Spain are probably false. Introduced into W. Europe in the 17th century, now cultivated in many countries, although not as extensively as *Prunus laurocerasus.* — Fig. 13.

Ecology. Few data; wild collections seen from 600—800 m.

Field-notes. Few available. Flowers *(i.e.* petals and filaments) white. Ripe fruits purple.

Remarks. Undoubtedly related to *P. laurocerasus* but well distinct from that species. The most obvious differences are those in the position of the basal glands and in the length of the racemes. See also p. 37.

Some cultivars are known; on this I may refer to books on cultivated plants, such as Krüssmann (1962).

5. Prunus laurocerasus L., Sp. Pl. (1753) 474 *('LauroCerasus');* Willd., Enum. Pl. Hort. Berol. (1809) 517; Dietr., Syn. 3 (1843) 43; Aschers. & Graebn., Syn. Mitteleur. Fl. 6, 2 (1907) 164; Koehne, Bot. Jahrb. 52 (1915) 302; Hegi, Ill. Fl. M. Eur. IV, 2 (1923) 1061; Chittenden, Dict. Gard. 3 (1951) 1697; Boom, Nederl. Dendrol. (1959) 246; Krüssmann, Handb. Laubgeh. 2 (1962) 259. — *Padus laurocerasus* (L.) Mill., Gard. Dict. ed. 8 (1768) unpaged; Moench, Meth. Plant. (1794) 672. — *Prunus grandifolia* Salisb., Prod. (1796) 356, *nom. superfl.* — *Cerasus laurocerasus* (L.) Lois., Nouv. Duh. 5 (1812) 6, *non vidi;* Ser. *in* DC., Prod. 2 (1825) 540; Spach, Hist. Nat. Vég. 1 (1834) 419. — *Laurocerasus officinalis* M. J. Roem., Synops. 3 (1847) 91; Schneid., Ill. Handb. Laubholzk. 1 (1906) 646, fig. 354 f, g; Komarov *in* Flora U.R.S.S. 10 (1941) 580, pl. 37. — *Laurocerasus vulgaris* Carr., Rev. Hortic. 49 (1877) 160, *nomen, prob. sphalm.* — *Laurocerasus ottinii* Carr., Rev. Hortic. 49 (1877) 159 *('ottini').*

Typification. *Prunus laurocerasus, Padus laurocerasus, Cerasus laurocerasus, Laurocerasus officinalis, Prunus grandifolia:* lectotype: *Linnaean Herbarium* sheet nr. 640.9 (LINN, only microfiche seen).

Laurocerasus ottinii: type unknown to me.

Small tree or shrub. *Twigs* glabrous. *Buds* protected by 5—7 perulae, of which the outer ones (1—4 mm long) hard and dark, the inner ones increasing in length up to 12 mm, more leathery, all or most with tridentate apex. *Leaves* oblong to obovate, in some cultivars linear-oblong, (5—)8—23 by (1½—)3—8 cm, index 2¼—3(—5½), base acute or rounded, apex usually shortly acuminate, margin dentate, often shallowly so, rarely entire, glabrous, coriaceous; nerves (6—)9—12 pairs, slightly prominent to slightly impressed above, slightly prominent to hardly visible beneath, venation not conspicuous; basal glands 2—4, rarely up to 6, or absent, flat, rather large, on the lower surface, usually near midrib; petiole ½—1(—1½) cm, glabrous. *Stipules* 8—12(—17) by 1—2½ mm, index 4—8, glabrous or with some hairs on inside, margin glandular. *Racemes* solitary, axillary, 3—16 cm, usually distinctly shorter than the supporting leaf, only

rarely about as long; peduncle up to 2 cm, but often almost 0; rachis glabrous. *Bracts* up to 7 mm long, at base some sterile, leathery ones (bud-scales), those partly with tridentate apex, 1½—4 mm long. *Pedicels* 1—6 mm, glabrous. *Hypanthium* 2—3½ mm high, glabrous outside, on inside with hairs on bottom and often some higher up. *Perianth* regularly 5-merous; sepals triangular, ½—1 mm long, glabrous outside, sparsely hairy inside; petals orbicular to elliptic or obovate, 3—3½ mm long, 3—7 times as long as sepals, glabrous. *Stamens* 15—25; filaments up to 4 mm long, glabrous; anthers *c.* 1 mm long. *Ovary* glabrous; style up to 5 mm, glabrous. *Fruits* ovoid, base rounded, apex acute, 8—14 by 5½—10 mm *in sicco*, mesocarp only late becoming thick and fleshy, consequently fruits of most herbarium-specimens not larger than *c.* 11½ by 8 mm, glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. Occurring wild in Jugoslavia, Bulgaria, Greece, Turkey, S. Russia between the Black and the Caspian Seas, N. Persia (cf. Hegi; only few wild specimens seen by me). In the 16th century introduced into W. Europe and now much cultivated. — Fig. 13.

Ecology. According to Hegi occurring from 0—2350 m in its native countries.

Field-notes. Few available. My own observations on flower-colour are: hypanthium greenish outside, orange inside, sepals lightgreen, petals and filaments white, anthers yellowish, ovary, style, and stigma lightgreen. The fruits are black when ripe.

Remarks. Four centuries of cultivation have resulted in several forms which are more or less distinctly different in their vegetative characters and physiology (frost-resistence, time of flowering). The several species, varieties, and formae, proposed for such garden-forms, have not been included in the synonymy. Descriptions of the cultivars are more in place in books on cultivated plants and to these the reader may, consequently, be referred.

The species is related to *P. lusitanica* and Ascherson & Graebner considered the two as one 'Sammelart' (collective species). A plausible hypothesis concerning their relationships is that before the Pleistocene glaciations there was in C. and S. Europe only one species that was segregated into two isolated populations when the approaching ice made climate unsuitable over part of its area. One of those populations gave rise to the present *P. lusitanica*, the other one to *P. laurocerasus*. Fossil leaves of Tertiary age, assigned to or at least related to *P. laurocerasus*, have been found in France and Austria (according to Hegi).

6. Prunus jenkinsii Hook. *f.*, Fl. Brit. Ind. 2 (1878) 317; Schneid., Ill. Handb. Laubholzk. 1 (1906) 650; Koehne, Bot. Jahrb. 52 (1915) 300.

Typification. Lectotype: *Griffith 2067*, holotype in K *(non vidi)*, isotypes seen from L, P; syntype: *Jenkins (396)* from Assam (P).

Tree, usually small?. *Twigs* glabrous, with some bud-scales at base, those not seen. *Leaves* oblong, 8—16½ by 2½—5 cm, index 2¾—4, base acute, rarely more rounded, apex acuminate, margin dentate, sometimes entire in basal part, often more or less undulating, glabrous, herbaceous, shining above, dull beneath; nerves 10—13 pairs, slightly prominent to slightly impressed above, slightly prominent beneath, venation not very conspicuous; basal glands 2, flat, rather large, in the entire corner but distinctly on the lower surface of the blade; petiole *c.* ½—¾(—1) cm. *Stipules* not seen. *Racemes* solitary, axillary, 5—8 cm; peduncle 1—2 cm; rachis sparsely pubescent. *Bracts* (few seen) caducous, 2—2½ mm long, pubescent outside, at base of raceme some 4 or 5 empty ones, those tripartite or with tridentate apex, 1—3 mm long, hard and dark. *Pedicels* 2—3 mm, sparsely pubescent. *Hypanthium* 1½—2 mm high, sparsely pubescent outside,

often at the base only, glabrous or with some few hairs on bottom inside. *Perianth* regularly 5-merous; sepals rounded-triangular, 1—1½ mm long, laciniate-ciliate; petals orbicular, 2—2½ mm long, 1½—2½ times as long as sepals, glabrous. *Stamens c.* 20—25; filaments up to 4 mm, glabrous; anthers 0.4—0.7 mm long. *Ovary* glabrous; style up to 5 mm. *Fruits* (few fruiting specimens seen) ellipsoid, narrowed towards base and apex, 17—22 by 12½—15 mm, index (1.1—)1.3—1.5(—1.7), glabrous; endocarp thick (1—2 mm), rugose outside, glabrous inside; seedcoat glabrous.

Distribution. India (Assam), East Pakistan, N. Burma, China (Yunnan). — Fig. 12.

Ecology. Forest, 1000—1800 m alt.

Field-notes. Very few available. Flowers white.

Remarks. To be distinguished from *P. spinulosa* by its much larger fruits. The leaves are larger too: in specimens of *spinulosa* the largest leaf is rarely longer than 9 cm, in *jenkinsii* not shorter than 12 cm.

The fruits of one specimen may be very variable in shape (index) and dimensions.

7. Prunus wallichii Steud., Nomencl. 2nd. ed. 2 (1841) 404; Merr., Contr. Arn. Arb. 8 (1934) 72; Merr., Brittonia 4 (1941) 88; Vidal, Adansonia 4 (1964) 146. — *Cerasus acuminata* Wall., Cat. (1829) n. 719, *nomen;* Wall., Pl. As. Rar. 2 (1831) 78, pl. 181, *descr.;* Spach, Hist. Nat. Vég. 1 (1834) 421. — *Prunus acuminata* (Wall.) Dietr., Syn. 3 (1843) 42, *comb. illeg. et superfl.;* Walp., Rep. 2 (1843) 10, *comb. illeg. et superfl.; non* Michx (1803); Hook. *f.*, Fl. Brit. Ind. 2 (1878) 317; Koehne, Bot. Jahrb. 52 (1915) 296, *incl.* f. *microbotrys* (Koehne) Koehne, l.c., f. *confusa* Koehne, l.c., f. *wallichii* (Steud.) Koehne, l.c., f. *vulgaris* Koehne, l.c. *et* f. *elongata* Koehne, l.c.; Craib, Fl. Siam. Enum. 1 (1931) 564; Vidal, Not. Syst. 13 (1948) 293. — *Laurocerasus acuminata* (Wall.) M. J. Roem., Synops. 3 (1847) 92. — *Cerasus wallichii* (Steud.) M. J. Roem., Synops. 3 (1847) 81. — *Prunus microbotrys* Koehne, Pl. Wilson. 1 (1911) 62.

Typification. *Cerasus acuminata, Prunus acuminata, Laurocerasus acuminata, Prunus wallichii, Prunus acuminata* f. *wallichii: Wallich 719 (non vidi).*

Prunus microbotrys, Prunus acuminata f. *microbotrys: Wilson 2847,* holotype in A?, isotype seen from E.

Prunus acuminata f. *confusa:* lectotype: *Hooker & Thomson s.n.,* holotype in L (mixed with *P. ceylanica),* isotypes seen from BM, BR, E, K, P; syntype: *unnamed coll. 693E (non vidi).*

Prunus acuminata f. *vulgaris:* Ten syntypes mentioned by Koehne, 5 of which seen by me.

Prunus acuminata f. *elongata:* Five syntypes, seen by me: *Henry 11173, 13187, 13187A* (all E).

Shrub or small tree, rarely larger than 12 m. *Twigs* glabrous, with *c.* 4 small cataphylls at base, those not or hardly functioning as bud-scales. *Leaves* elliptic to oblong, rarely ovatish, 7—15 by 2—6 cm, index 2—3(—3½), base acute, rarely more rounded, apex acuminate, margin entire, sometimes serrulate to serrate or crenate, mainly in the upper half, glabrous, herbaceous, often very thin; nerves 6—9 pairs, flat above, little prominent beneath, often distinctly looped and joined at *c.* 3—8 mm from the margin, venation hardly visible; basal glands (fig. 7 f) at least 2, usually more, flat, small, on the surface of the blade, additional glands usually many, in 2 rows more or less parallel to midrib, especially in lower part of leaf, but sometimes up to the apex; petiole ¼—1 cm. *Stipules* (few seen) 4—6 by ¾—1 mm, index 4—7½, glabrous or almost so, entire, caducous. *Racemes* solitary or in fascicles of 2—3(—4), in axils of usually still extant leaves, 2—10 cm; peduncle up to ½(—1) cm; rachis glabrous or sparsely pubescent. *Bracts* caducous,

1—1½ mm long, glabrous or almost so, lower ones sometimes with tridentate apex, at entire base some sterile, larger (—3 mm) and thicker ones. *Pedicels* 2—8 mm, glabrous or sparsely pubescent. *Hypanthium* 1½—2 mm high, glabrous outside, on inside hairy especially in basal part. *Perianth* (fig. 1 a) with few exceptions regularly biseriate, 5-merous; sepals triangular, ½—¾ mm long, glabrous outside, on inside at least the apex hairy; petals elliptic, 2—4 mm long, 3—8 times as long as sepals, glabrous. *Stamens* 10—20(—30); filaments up to 3 mm, glabrous; anthers 0.6—0.8 mm long. *Ovary* densely to sparsely hairy, usually glabrous on ventral suture, sometimes with only a tuft of hairs on dorsal side; style up to 4 mm, often with some hairs at base. *Fruits* ovoid to ellipsoid, base rounded, apex more acute, 10—18 by 6—11 mm *in sicco*, glabrous; mesocarp thick and fleshy and ripe fruits probably up to *c.* 22 by 15 mm *in vivo;* endocarp thin (0.4—0.7 mm); seedcoat glabrous.

Distribution. E. India (Sikkim, Darjeeling, Assam), East Pakistan, China (Szechwan, Kweichow, Kiangsi, Yunnan, Kwangsi, Kwangtung), Upper Burma, N. Thailand, Laos (according to Vidal), N. Vietnam (idem), S. Vietnam, Sumatra (Westc., Eastc.), Malaya (Pahang). — Fig. 12.

Ecology. Montane and subalpine forest and thickets, (600—)1000—3000(—3600) m alt.

Compilation of field-notes. Bark brown, smooth or warty, inner bark 2—5 mm, redbrown. Flowers usually said to be white and fragrant. Fruits purplish black when ripe. *Vernaculars: Lali* (India, Chittagong), *Katjihe* or orthographic variants of it (Sumatra, Karo). *Uses:* fruits once noted as edible (Assam).

Remarks. In herbarium specimens appearance and dimensions of the fruits are rather variable, depending on their age and degree of development when collected. Not entirely ripe fruits still have a thin mesocarp which does not shrivel much in drying, so that dimensions of the dry fruits are only slightly larger than those of the stone (up to *c.* 18 by 10 mm). Ripe fruits have a fleshy thick mesocarp which shrivels very much in drying; they attain up to *c.* 20 by 12 mm in the herbarium, and probably up to *c.* 22 by 15 mm in the living state; the stone is, however, not larger than in the unripe fruits.

The species is possibly most closely related to *P. jenkinsii* but occupies a rather isolated position in the section.

8. Prunus spinulosa S. & Z., Abh. K. Bayer. Ak. Wiss. M.-Ph. Kl. 4 (1845) 122; Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 91; Koidzumi, J. Coll. Sc. Imp. Un. Tokyo 34, 2 (1913) 290; Koehne, Bot. Jahrb. 52 (1915) 300; Makino, Ill. Fl. Japan, 2nd ed. (1954) 442, fig. 1325; Vidal, Adansonia 4 (1964) 146. — *Prunus sundaica* Miq., Fl. Ind. Bat. 1, 1 (1855) 365 *et* 1, 1 (1858) 1085, *e descr.;* C. Muell. *in* Walp., Ann. 4 (1857) 651. — *Prunus nitidissima* Hassk., Nat. Tijd. N.I. 10 (Retzia 1) (1856) 175, *e descr.;* C. Muell. *in* Walp., Ann. 4 (1857) 653. — *Laurocerasus spinulosa* (S. & Z.) Schneid., Ill. Handb. Laubholzk. 1 (1906) 649, fig. 354. — *Prunus marginata* Dunn, J. Bot. 45 (1907) 402, *e descr.;* Koehne, Bot. Jahrb. 52 (1915) 300. — *Prunus spinulosa* S. & Z. var. *pubiflora* Koehne, Bot. Jahrb. 52 (1915) 300, *e descr.;* Vidal, Adansonia 4 (1964) 146. — *Prunus balfourii* Card., Not. Syst. 4 (1920) 22, *e descr.* — *Prunus limbata* Card., Not. Syst. 4 (1920) 21, *e descr.*

Typification. *Prunus spinulosa, Laurocerasus spinulosa:* lectotype: *Siebold s.n.*, holotype and several isotypes in L.

Prunus spinulosa var. *pubiflora: Henry 13228 (non vidi).*

Prunus sundaica: Blume s.n. (non vidi).

Prunus nitidissima: unnamed coll. (non vidi).

Prunus marginata: Dunn 1430 (non vidi).

Prunus balfourii: Maire 593 (non vidi).

Prunus limbata: Henry 13228, holotype in E *(non vidi).*

Small tree, up to 20 m, or shrub. *Twigs* glabrous or pubescent. *Buds* protected by *c.* 10—12 perulae, those up to 4½ mm long, with tridentate apex, outer ones entirely hard and dark, inner ones so only in the apical part, side-lobes far larger than central lobe and hairy inside, ciliate and with marginal glands. *Leaves* oblong, rarely widest slightly below or above the middle, 5—9(—11) by 1½—4 cm, index 2½—4, base acute, often unequal, rarely more rounded, apex acuminate, margin sometimes entire, sometimes dentate, often only so towards apex, often undulating, glabrous, herbaceous to slightly coriaceous, glossy above, dull beneath; nerves *c.* 7—12 pairs, but stronger tertiary nerves parallel to and often as strong as secondary ones and consequently not to be distinguished, flat to slightly prominent above, hardly prominent beneath, venation not conspicuous; basal glands (fig. 7 e) 1 or 2, rarely 0, flat or more or less cupular, near or in the margin or on border of blade and petiole; petiole (1—)5—10 mm, glabrous. *Stipules* not seen in mature state, obviously free, ciliate. *Racemes* solitary, axillary, (1½—)3—10 cm; peduncle ½—2½ cm; rachis sparsely pubescent. *Bracts* caducous (few seen), up to 2½ mm long, lower ones sterile, basal ones more persistent, hard and dark, *c.* 1 mm long. *Pedicels* 1—4 mm, sparsely pubescent. *Hypanthium* 1½—2 mm high, glabrous or almost so outside (densely pubescent in 'var. *pubiflora'*), glabrous inside or with hairs on the bottom. *Perianth* regularly 5-merous; sepals rounded-triangular, ¾—1 mm long, more or less laciniate, glabrous; petals orbicular, 2—2½ mm long, 2—3 times as long as sepals, glabrous. *Stamens c.* 25—35; filaments up to 4 mm, glabrous; anthers 0.3—0.5 mm long. *Ovary* glabrous; style up to 4 mm. *Fruits* (few seen) ellipsoid, 9—11 by 6—8 mm, index 1.4—1.6, glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. China (Hupeh, Chekiang, Kweichow, Hunan, Kiangsi, Kwangsi, Kwangtung, according to Koehne and Cardot also in Yunnan), Japan (Honshu, Shikoku, Kyushu, Ryukyu, partly according to Koidzumi). Koidzumi mentioned also the Philippines, this is improbable. — Fig. 14.

Ecology. Dense to open forests or thickets, 400—1200 m.

Compilation of field-notes. Leaves pale green beneath. Flowers white. Fruits black when ripe.

Remarks. P. sundaica and *P. nitidissima* were based on cultivated trees, growing in Java. I could not locate the type specimens, the names are referred to the present species on the authority of Koehne.

I also did not see the types of three other synonyms *(balfourii, limbata, marginata)*, but there is in my mind hardly any doubt about their identity.

The species is related to *P. jenkinsii*, but certainly specifically different, see p. 37.

9. Prunus phaeosticta (Hance) Maxim., Bull. Ac. Imp. Sc. St. Pétersb. 29 (1883) 110; Koidzumi, J. Coll. Sc. Imp. Un. Tokyo 34, 2 (1913) 291; Koehne, Bot. Jahrb. 52 (1915) 300; Card. *in* Fl. Gén. I. C. 2 (1920) 624, *excl.* var. *promecocarpa* Card., l.c. p. 625, *quoad est P. fordiana;* Card., Not. Syst. 4 (1920) 20; Rehd., J. Arn. Arb. 11 (1930) 162, 163, *incl.* f. *dentigera* Rehd., l.c. *et* f. *lasioclada* Rehd., l.c.; Kaneh., Formos. Trees, 2nd ed. (1936) 271, fig. 221; Vidal, Not. Syst. 13 (1948) 293 *('phoeosticta'), excl.* var. *ancylocarpa* Vidal, l.c., *et* var. *dimorphophylla* Vidal, l.c., *quoad sunt P. fordiana;* Liu, Ill. Nat. & Intr. Lign. Pl. Taiw. 1 (1960) 444; Li, Woody Fl. Taiw. (1963) 284. — *Pygeum phaeostictum* Hance, J. Bot. 8 (1870) 72. — *Prunus punctata* Hook. *f.*, Fl. Brit. Ind. 2 (1878) 317, *e descr.;* Hayata, Ic. Pl. Formos. 1 (1911) 218; Craib, Fl. Siam. Enum. 1 (1931) 566. — *Prunus*

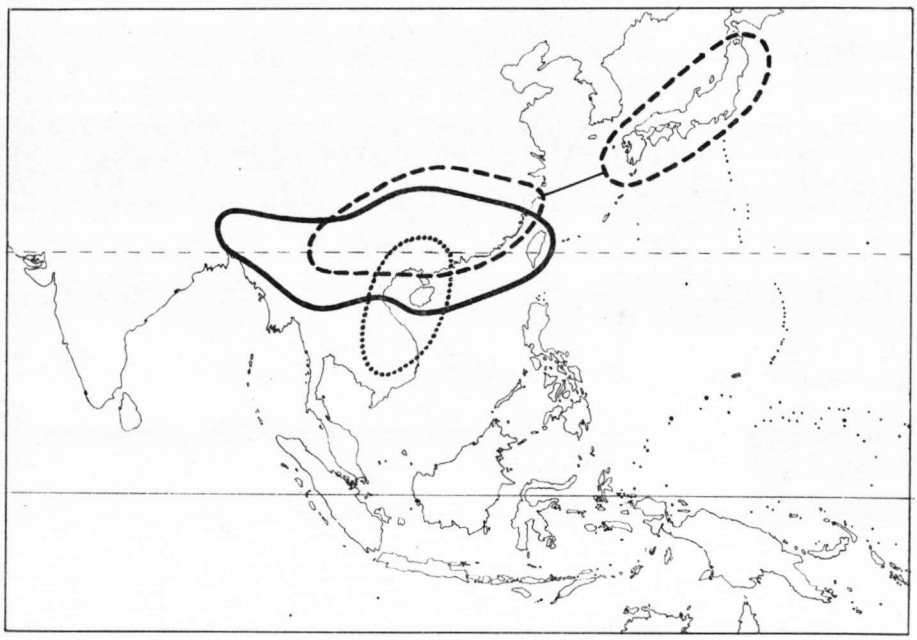

Fig. 14. Distribution of 8. *P. spinulosa* (— — — —), 9. *P. phaeosticta* (————), 10. *P. fordiana* (. . . . .).

xerocarpa Hemsl., Ann. Bot. 9 (1895) 152, *e descr.* — *Laurocerasus phaeosticta* (Hance) Schneid., Ill. Handb. Laubholzk. 1 (1906) 649, fig. 355. — **Fig. 15.**

Typification. *Pygeum phaeostictum, Prunus phaeosticta, Laurocerasus phaeosticta:* lectotype: *Hance 6015,* holotype in K *(non vidi),* isotypes seen from CAL, P; syntype: *Bowring s.n. (non vidi).*

Prunus punctata: Jenkins s.n. from Khasi Mts, holotype in K *(non vidi).*

Prunus xerocarpa: syntypes: *Henry 1656, 1658, 1658A (non vidi).*

Prunus phaeosticta f. *dentigera: Fang 1314,* holotype in A *(non vidi),* isotype seen from E.

Prunus phaeosticta f. *lasioclada: Henry 11666,* holotype in A; paratypes: *Forrest 15750, 15802, 17489, 17710, 17721, 17760, 17888, 18112, 26500* (all seen from E).

Shrub or small tree, up to 12 m. *Twigs* glabrous or sparsely to densely pubescent when young. *Buds* protected by some (up to more than 10) perulae (fig. 5 b), these up to 4 mm long, partly with tridentate apex, hard and stiff, dark-coloured, (almost) glabrous, probably grading into the raceme-bearing cataphylls. *Leaves* oblong to ovate-oblong or obovate-oblong, 6—13 by 2—4½ cm, index 2½—3(—3½), base acute, rarely rounded, apex acuminate to long-caudate, acumen up to 1½ cm long, margin entire or (especially in upper half) dentate, glabrous, herbaceous (often thin) to slightly coriaceous, densely black-punctate beneath; nerves 6—9 pairs, usually slightly prominent above and rather prominent to slightly so beneath, often distinctly looped and joined at 1—3 mm from the margin, venation widely reticulate, slightly prominent at either side; basal glands 2, flat, in the blade but often very near the margin (fig. 7 c, d); petiole ¼—¾ cm, glabrous. *Stipules* 10—18 by 1—2½ mm, index 6—10, distinctly glandular-serrate, glabrous outside, glabrous or with few hairs inside, caducous. *Racemes* solitary, in axils of cataphylls (fig. 5 a) or of normal leaves in the basal part of lateral branches, 2—6 cm; peduncle

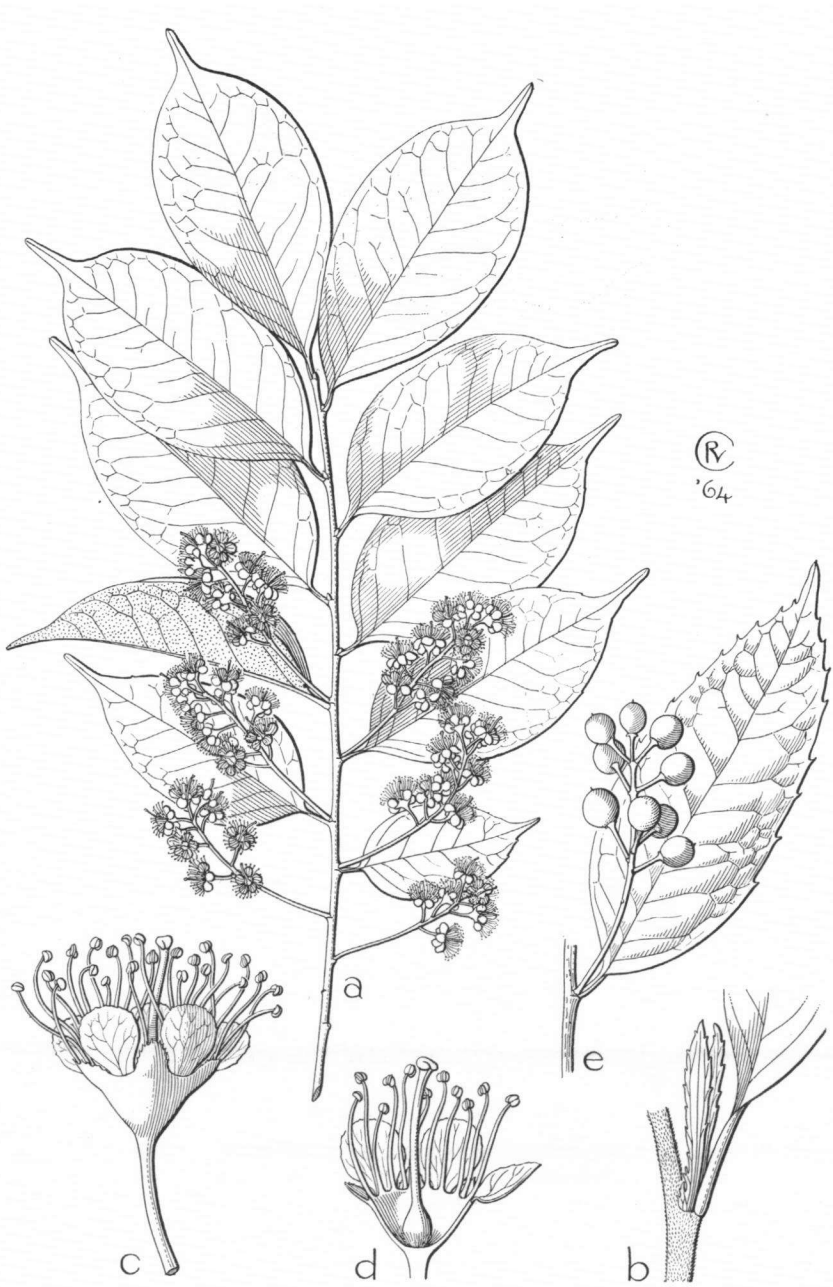

Fig. 15. *Prunus phaeosticta*.— a. flowering twig (× $^{2}/_{3}$); b. leaf-base and stipules (× 2); c. flower, and d. halved flower (× 4); e. infructescence (× $^{2}/_{3}$). (a, c, d. from *Ford s.n.*; b. from *Forrest 17710*; e. from *Fang 1314*).

¼—*c.* 1½ cm long; rachis glabrous or sparsely pubescent; raceme-bearing cataphylls (few seen) up to *c.* 9 by 4½ mm, hard and dark at the tridentate apex, caducous. *Bracts* up to 4 mm long, glandular-serrate, glabrous, caducous, all fertile. *Pedicels* 2—7 mm, glabrous or sparsely puberulous. *Hypanthium* 1½—2 mm high, glabrous outside, inside with hairs on bottom and often also higher up. *Perianth* usually regularly 5—merous, but irregularities not exactly rare; sepals rounded triangular, ¾—1¼ mm long, laciniate and more or less ciliate; petals orbicular, 2—3 mm long, 2½—4 times as long as sepals, glabrous. *Stamens* 20—35; filaments up to 5 mm, glabrous; anthers 0.4—0.7 mm long. *Ovary* glabrous, very rarely with some hairs; style up to 5 mm, glabrous. *Fruits* subglobular to transversely ellipsoid, 5½—9½(—11) by 6—10 mm, index 0.8—1.1, glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. China (Szechwan, Kweichow, Hunan, Kiangsi, Fukien, Yunnan, Kwangsi, Kwangtung, Hongkong, Hainan), Taiwan, India (Assam), East Pakistan, Upper Burma, N. Thailand, N. Vietnam. — Fig. 14.

Ecology. Forest and thickets, (500—)900—2800 m alt.

Field-notes. Few available. Flowers usually reported as white or creamy white. Fruits black when ripe.

Remarks. Related to *P. fordiana*, see p. 44. Usually well-recognizable through the caudate leaves which are black-punctate beneath (a character that, except in *P. phaeosticta* and *fordiana*, only is found in *P. javanica* and *mirabilis.)*

Rehder divided the species into three formae, differing in the incisions of the leaf-margin and in the pubescence of the twigs:

f. *phaeosticta*, leaves quite entire, twigs glabrous;

f. *lasioclada*, leaves entire or denticulate on the same twig, twigs short-villous;

f. *dentigera*, leaves dentate, twigs glabrous.

The correlation of these two characters, however, is not as strict as supposed by Rehder: specimens with pubescent twigs may also have distinctly dentate leaves, and specimens with glabrous twigs may possess faintly denticulate leaves. That is why I have not formally recognized any infraspecific entities.

10. Prunus fordiana Dunn, J. Bot. 45 (1907) 402; Vidal, Adansonia 4 (1964) 143, *incl.* var. *racemopilosa* Vidal, l.c. p. 144, *e descr., et* var. *balansae* (Koehne) Vidal, l.c. p. 143. — *Prunus balansae* Koehne, Bot. Jahrb. 52 (1915) 301; Card. *in* Fl. Gén. I.C. 2 (1920) 625, fig. 59; Vidal, Not. Syst. 13 (1948) 294, *incl.* var. *ilicifolia* Vidal, l.c. p. 294, *e descr.* — *Prunus multipunctata* Card. *in* Fl. Gén. I.C. 2 (1920) 626, fig. 59; Card., Not. Syst. 4 (1920) 20. — *Prunus phaeosticta* (Hance) Maxim. var. *promecocarpa* Card. *in* Fl. Gén. I.C. 2 (1920) 625, *e descr.*; Card., Not. Syst. 4 (1920) 20.— *Prunus phaeosticta* (Hance) Maxim. var. *ancylocarpa* Vidal, Not. Syst. 13 (1948) 293 *('phoeosticta')*. — *Prunus phaeosticta* (Hance) Maxim. var. *dimorphophylla* Vidal, Not. Syst. 13 (1948) 293 *('phoeosticta')*, *e descr.*

Typification. *Prunus fordiana: Dunn's coll. 903 (non vidi).*

Prunus fordiana var. *racemopilosa: Tsang 27163*, holotype in P *(non vidi).*

Prunus balansae, Prunus fordiana var. *balansae:* lectotype chosen by Vidal: *Balansa 3391*, holotype prob. lost in B, isotypes seen from L, P; syntype: *Balansa 3392* (P).

Prunus balansae var. *ilicifolia: Chevalier 40212*, holotype in P *(non vidi).*

Prunus multipunctata: lectotype chosen by Vidal: *Bon 4213*, holotype in P; syntype: *Eberhardt 2431* (P).

Prunus phaeosticta var. *promecocarpa:* syntypes: *Bon 3319, 3367, 4070 (non vidi).*

Prunus phaeosticta var. *ancylocarpa: Poilane 23266*, holotype in P.

Prunus phaeosticta var. *dimorphophylla: Poilane 7110*, holotype in P *(non vidi)*.

Small tree, usually less than 10 m, or shrub. *Twigs* glabrous or sparsely puberulous when very young. *Buds* protected by 3—4 perulae, up to 5 mm long, tripartite or with tridentate apex, glabrous but lateral lobes ciliate (and with glandular margins). *Leaves* oblong, 6—15 by 2—5 cm, index 2¼—3¼, base acute, apex acuminate, margin entire, rarely dentate, glabrous, herbaceous to slightly coriaceous, densely dark-punctate beneath (rarely also above); nerves 7—11 pairs, flat to slightly prominent above, hardly prominent beneath, often distinctly looped and joined at some distance from the margin, venation hardly visible; basal glands 2—4, rarely 0, flat, always on lower surface of blade, but often in the entire base or near the margin; petiole ¼—¾ cm, glabrous. *Stipules* (few seen) up to 7 by ¾—1 mm, index *c.* 7—10, glabrous, margin ciliate and glandular. *Racemes* solitary, axillary, 3—9(—12) cm; peduncle up to 2 cm; rachis glabrous (densely pubescent in 'var. *racemopilosa*'). *Bracts* up to 5 mm long, caducous, ciliate, lower ones sterile, basal ones hard and dark, longer persistent; bracteoles (once seen, in very young bud) minute, up to 1 mm long. *Pedicels* 3—7 mm, glabrous. *Hypanthium* 2 mm high, glabrous outside, on the inside with hairs (sometimes only few) on bottom. *Perianth* 5-merous; sepals rounded-triangular, 1—1¼ mm long, ciliate; petals orbicular, *c.* 2½ mm long, 2—2½ times as long as sepals, glabrous. *Stamens c.* 25—36; filaments up to 3½ mm, glabrous; anthers *c.* 0.5 mm long. *Ovary* glabrous; style up to 4 mm, glabrous. *Fruits* ovoid to ellipsoid, 9—14 by 7—8 mm, index 1.3—1.7, glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. China (Kwangsi, Kwangtung, Hainan), Cambodia, N. and S. Vietnam. — Fig. 14.

Ecology. Forest and thickets, 300—750(—1400?) m alt.

Compilation of field-notes. Bark brown. Leaves dark shiny green above, pale beneath. Flowers white. Fruits black when ripe.

Remarks. Vidal (1964) distinguished three varieties in this species; according to him var. *balansae* differs from var. *fordiana* in having larger leaves with well-marked acumen and extra-marginal glands. The material I have seen, does not permit such a subdivision, leaf-variation being continuous. Vidal's third variety, var. *racemopilosa*, differs in having pubescent racemes. I did not see the type-specimen, but it may be recalled that also in *P. phaeosticta* both glabrous and more or less densely pubescent racemes can be found.

The main difference with the related *P. phaeosticta* is found in the fruits: those of *fordiana* are ovoid or ellipsoid, those of *phaeosticta* subglobular to transversely ellipsoid. When flowering, *fordiana* can be distinghuished by the empty bracts (bud-scales) at the base of the racemes, which are always absent in *phaeosticta*.

11. Prunus zippeliana Miq., Fl. Ind. Bat. 1, 1 (1855) 367; C. Muell. *in* Walp., Ann. 4 (1857) 652; Hisauchi, J. Jap. Bot. 12 (1936) 54, *incl.* var. *sphaerocarpa* (Nakai) Hisauchi, l.c.; Makino, Ill. Fl. Japan, 2nd ed. (1954) 442, fig. 1326 *('Dippeliana')*, *incl.* var. *infra-velutina* Makino, l.c., *nom. inval.*; Liu, Ill. Nat. & Intr. Lign. Pl. Taiw. 1 (1960) 449. — *Prunus macrophylla* S. & Z., Abh. K. Bayer. Ak. Wiss. M.-Ph. Kl. 4 (1845) 122, *nom. illeg.*, *non* Poir. *in* Lamk. (1816); Miq., Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 91; Koidz., J. Coll. Sc. Imp. Un. Tokyo 34, 2 (1913) 291; Koehne, Bot. Jahrb. 52 (1915) 303, *incl.* var. *puberifolia* Koehne, l.c. p. 304; Card. *in* Fl. Gén. I.C. 2 (1920) 622; Card., Not. Syst. 4 (1920) 23; Nakai, J. Arn. Arb. 5 (1924) 78, *incl.* var. *sphaerocarpa* Nakai, l.c.; Kaneh., Formos. Trees, 2nd ed. (1936) 270, fig. 218; Li, Woody Fl. Taiw. (1963) 283; Vidal, Adansonia 4 (1964) 145, *incl.* var. *adenopoda* (K. & V.) Vidal, l.c., *pro min. parte*, *typo excl.* — *Pygeum oxycarpum* Hance, J. Bot. 8 (1870) 242. — *Prunus oxycarpa* (Hance)

Maxim., Bull. Ac. Imp. Sc. St. Pétersb. 29 (1883) 111. — *Laurocerasus macrophylla* (S. & Z.) Schneid., Ill. Handb. Laubholzk. 1 (1906) 647, fig. 355, *incl.* var. *oxycarpa* (Hance) Schneid., l.c. — *Prunus macrophylla* S. & Z. var. *crassistyla* Card. *in* Fl. Gén. I.C. 2 (1920) 622, *e descr.;* Card., Not. Syst. 4 (1920) 23. — *Prunus kanehirai* Hayata *(in herb.) ex* Hisauchi, J. Jap. Bot. 12 (1936) 54, *e descr.;* Kaneh., Formos. Trees, 2nd ed. (1936) 708.

Typification. *Prunus zippeliana: Zippel s.n.*, holotype in L, sheet nr. 908.202-880.

Prunus macrophylla, Laurocerasus macrophylla: lectotype: *Siebold s.n.*, holotype and several isotypes in L.

Prunus macrophylla var. *puberifolia:* syntypes: *Wilson 2540, 4071 (non vidi).*

Prunus macrophylla var. *sphaerocarpa, Prunus zippeliana* var. *sphaerocarpa: Maximowicz s.n.* from Nagasaki, holotype in A *(non vidi)*, isotypes seen from L, P.

Prunus macrophylla var. *crassistyla:* lectotype chosen by Vidal: *Bon 3814*, holotype in P *(non vidi);* syntype: *Beauvais s.n. (non vidi).*

Prunus macrophylla var. *adenopoda:* see under *Prunus adenopoda*, p. 46.

Pygeum oxycarpum, Prunus oxycarpa, Laurocerasus macrophylla var. *oxycarpa: Sampson & Hance 16424*, holotype prob. in K *(non vidi)*, isotypes seen from CAL, P.

Prunus kanehirai: Kanehira s.n. from Taiwan, holotype in TI *(non vidi)*, no isotypes seen.

Tree up to 20(—30) m, or shrub of more than 2 m. *Twigs* glabrous, some 3 or 4 cataphylls at the base, these obviously not functioning as bud-scales. *Leaves* oblong to obovate, 8—19 by (2½—)3½—8 cm, index 1¾—3(—3¼), base acute, rarely rounded, apex acute to acuminate, margin glandular-serrate to -dentate, glabrous, rarely (watershoots?) pubescent beneath, herbaceous to coriaceous; nerves 7—11 pairs, flat or slightly impressed above, slightly prominent beneath, venation widely reticulate, hardly visible; basal glands 2, on upper or lateral surface of petiole, usually large and distinctly protruding, very rarely wanting; petiole (¾—)1—2 cm, glabrous. *Stipules* 6—8 by ¾—1 mm, index 6—8, free, glabrous outside, inside with some hairs on base of slightly keeled midrib. *Racemes* simple, or (rarely) with 1—2 side-branches at very base, in axils of leaves or their scars, or in axils of cataphylls at base of shoot, 1½—6 cm; peduncle very short or 0; rachis pubescent. *Bracts* up to 2 mm long, pubescent outside, lower fertile ones often with tridentate apex, the lowermost ones empty, stouter, more glabrous, distinctly tripartite, up to 3 mm long. *Pedicels* 1½—4 mm, pubescent. *Hypanthium c.* 2 mm high, sparsely pubescent (to glabrous) outside, usually with some hairs on bottom inside. *Perianth* regularly (4—)5-merous; sepals triangular to semi-orbicular, ¾—1(—1½) mm long, ciliate, at least at apex; petals more or less orbicular, 2—3(—4) mm long, 2½—3 times as long as sepals, usually distinctly ciliate. *Stamens c.* 18—25; filaments up to 4 mm, glabrous; anthers 0.4—0.6 mm long. *Ovary* glabrous; style up to 4 mm, glabrous. *Fruits* ovoid, base rounded, apex acute, 17—20 by 7—10 mm, index (2—)2¼—2¾, glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. China (Szechwan, Hupeh, Chekiang, Hunan, Kiangsi, Fukien, Yunnan, Kwangsi, Kwangtung), Taiwan (according to Kanehira and Li), Japan (Honshu, Shikoku, Ryukyu, Kyushu, partly according to Koidzumi), N. Vietnam (Tonkin, according to Cardot and Vidal). Koidzumi mentioned also the Philippines, most probably this is incorrect. The type of *P. zippeliana* from Java must originate from a cultivated tree. — Fig. 16.

Ecology. Open forest and thickets, 600—3000 m.

Compilation of field-notes. Bark rust-coloured. Flowers white or creamy white. Fruits turning red and finally black, smelling like bitter almonds when crushed.

Remarks. Related to *P. adenopoda*, see the remarks below.

The status of Cardot's var. *crassistyla* (united by Vidal with *P. adenopoda* to his var. *adenopoda)* is not entirely clear; I did not see the type, but description and distribution make it most probable that it does indeed belong to the present species.

Koehne's var. *puberifolia* is most probably based on watershoots, the one specimen I saw certainly gives that impression. Normal leaves are entirely glabrous.

12. Prunus adenopoda K. & V., Bull. Inst. Bot. Btzg. 2 (1899) 10; K. & V., Bijdr. 5 (1900) 347; K. & V. *in* Ic. Bog. 2 (1904) 167, t. 139; Back., Schoolfl. (1911) 448; Koord., Exk. Fl. Java 2 (1912) 337; Koord., Atlas 1 (1913) pl. 96; Koehne, Bot. Jahrb. 52 (1915) 304. — *Prunus pseudoadenopoda* Koord., Bull. Jard. Bot. Btzg. III, 1 (1918) 84, fig. 5, *e descr. et fig.* — *Prunus javanica (non* (T. & B.) Miq.) Meeuse & Adelbert *in* Back., Bekn. Fl. Java (em. ed.) IV C 2 (1943) fam. 116, p. 24, *pro parte;* Back. & Bakh. *f.*, Fl. Java 1 (1963) 521, *pro parte.* — *Prunus macrophylla* var. *adenopoda* (K. & V.) Vidal, Adansonia 4 (1964) 145, *comb. illeg., p. max. p., typo incl.*

Typification. *Prunus adenopoda, Prunus macrophylla* var. *adenopoda:* lectotype chosen by Vidal: *Koorders 6419β*, holotype in BO *(non vidi)*, isotype seen from L; syntype: *Koorders 10014β (non vidi).*

Prunus pseudoadenopoda: Koorders 40165β, holotype in BO *(non vidi).*

Small tree, up to 12 m. *Twigs* glabrous. *Leaves* elliptic to oblong, 8—17 by 4—6½ cm, index 2—2¾, base acute to more or less rounded, apex acuminate, margin entire, glabrous, coriaceous; nerves 7—10 pairs, flat or slightly prominent above, hardly prominent beneath, venation widely reticulate, hardly visible; basal glands (fig. 7 l) in most leaves 2, on the petiole, large and protruding, more or less stalked; petiole ¾—1(—1¼) cm. *Stipules* 5—12½ by 0.9—1.2 mm, index 5—10, free, glabrous or with some hairs at base inside. *Racemes* solitary, in axils of (rarely already fallen) leaves, up to 2½ cm; peduncle practically 0; rachis pubescent. *Bracts* up to 3½ mm long, pubescent on either side, lower flower-bearing ones with tridentate apex, some empty ones at base of raceme. *Pedicels* up to 2½ mm, up to 5 mm under the fruit, sparsely hairy. *Hypanthium* 1½—2 mm high, (almost) glabrous outside, glabrous inside. *Perianth* regularly 5-merous; sepals triangular with rounded apex, *c.* 1 mm long, ciliate at least at apex; petals orbicular, 2½—3 mm long, glabrous. *Stamens c.* 25—35; filaments up to 5 mm long, glabrous; anthers 0.3—0.5 mm long. *Ovary* glabrous; style up to 4½ mm, glabrous. *Fruits* ellipsoid, with attenuate base and acute apex, 19—22 by 10—13 mm, index 1½—2, glabrous; mesocarp probably thick when fully ripe and then the living fruit possibly up to *c.* 24 by 18 mm; endocarp thin, glabrous inside; seedcoat glabrous.

Distribution. Java (Bantam, Preanger, Pekalongan, Banjumas, Malang, according to K. & V. also Bogor). — Fig. 16.

Ecology. From 0 to 500 m alt. *Koorders 10014β* was collected on a limestone rock near the seacoast, the roots being partly under water. Other collections come from inland rain-forest. Data on ecology are very scarce, but a preference for lime-containing soils does seem probable.

Field-notes hardly available.

Remarks. Although Meeuse & Adelbert considered *P. adenopoda* to be conspecific with *P. javanica*, it seems to be more nearly related to *P. zippeliana.* Vidal indeed considered it to be no more than a variety of the latter species (called *P. macrophylla* by him). I have not followed him; the differences (see the key) appear to be large enough to retain the specific status. Vidal put also *P. macrophylla* var. *crassistyla* from Tonkin under the same variety (and consequently should have retained that name). I did not see the type of

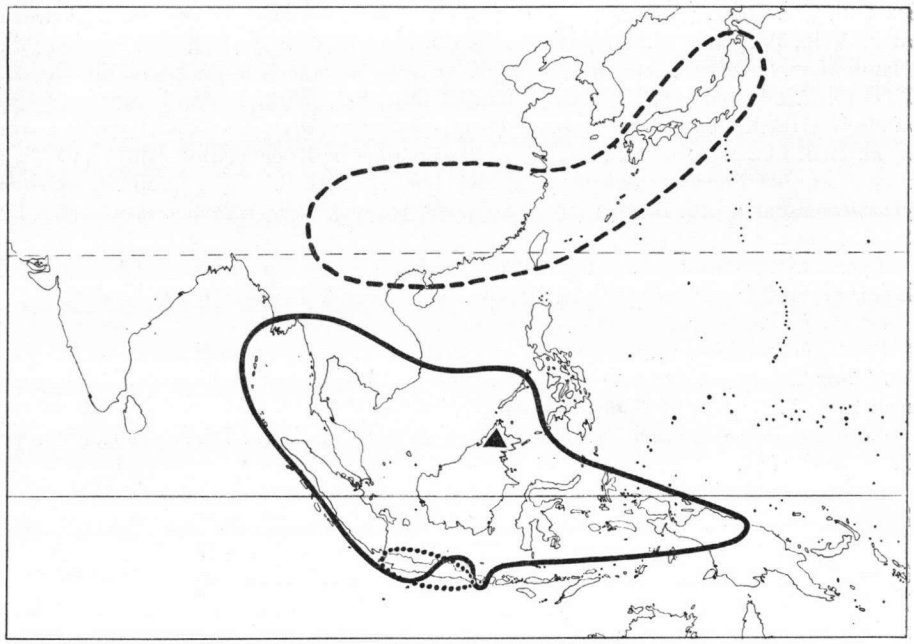

Fig. 16. Distribution of 11. *P. zippeliana* (— — — —), 12. *P. adenopoda* (. . . . . .), 13. *P. javanica* (————), 14. *P. mirabilis* (▲).

var. *crassistyla*, but in view of the length of the raceme I let the name remain in the synonymy of *P. zippeliana*.

According to the description, *P. pseudoadenopoda* only differs in having no glands on the petiole. As they are in *P. adenopoda* usually also absent in part of the leaves, I do not consider this sufficient for separating the two.

13. Prunus javanica (T. & B.) Miq., Fl. Ind. Bat. 1, 1 (1855) 365; C. Muell. *in* Walp., Ann. 4 (1857) 652; Kurz, J. As. Soc. Beng. 40, 2 (1871) 52; K. & V. *in* Ic. Bog. 2 (1904) 169, t. 140; Back., Schoolfl. (1911) 448; Koord., Exk. Fl. Java 2 (1912) 337; Koord., Atlas 1 (1913) pl. 95; Koehne, Bot. Jahrb. 52 (1915) 297; Hall. *f.*, Beih. Bot. Centralbl. 34 (1917) 24, *incl.* var. *angustifolia* Hall. *f.*, l.c.; Merr., Enum. Born. (1921) 289; Meeuse & Adelb. *in* Back., Bekn. Fl. Java (em. ed.) IV C 2 (1943) fam. 116, p. 24, *excl. syn. P. adenopoda;* Steen., Nova Guinea, Bot. n. 3 (1960) 13; Back. & Bakh. *f.*, Fl. Java 1 (1963) 521, *excl. syn. P. adenopoda.* — *Cerasus*? *martabanica* Wall., Cat. (1830) n. 4902, *nomen.* — *Cerasus javanica* T. & B., Nat. Tijd. N.I. 2 (1851) 309; T. & B., Ned. Kruidk. Arch. 3 (1855) 412. — *Prunus junghuhniana* Miq., Pl. Jungh. (1855) 402; Miq., Fl. Ind. Bat. 1, 1 (1855) 366; C. Muell. *in* Walp., Ann. 4 (1857) 652; Merr., Philip. J. Sc. 5 (1910) Bot. 180; Koehne, Bot. Jahrb. 52 (1915) 298; Merr., Enum. Philip. 2 (1923) 234. — *Nelitris alternifolia* Miq., Fl. Ind. Bat. 1, 1 (1855) 476. — *Prunus martabanica* Kurz, Rep. Andam. (1870) 37, *nomen;* Kurz, J. As. Soc. Beng. 45, 2 (1877) 303, *nomen;* Kurz, For. Fl. Brit. Burma 1 (1877) 434, *e descr.;* Hook. *f.*, Fl. Brit. Ind. 2 (1878) 316; King, J. As. Soc. Beng. 66, 2 (1897) 285, *incl.* var. *scortechinii* King, l.c. p. 286; Koehne, Bot. Jahrb. 52 (1915) 298; Ridl., Fl. Mal. Penins. 1 (1922) 672. — *Pygeum nitidum* Pierre *in* Lanessan,

Pl. Util. Col. Franc. (1886) 284 *('Pigeum')*. — *Decaspermum alternifolium* (Miq.) Niedenzu *in* E. & P., Pfl. Fam. III, 7 (1893) 70. — *Laurocerasus javanica* (T. & B.) Schneid., Ill. Handb. Laubholzk. 1 (1906) 647. — *Laurocerasus martabanica* (Kurz) Schneid., Ill. Handb. Laubholzk. 1 (1906) 648. — *Prunus forbesii* Koehne, Bot. Jahrb. 52 (1915) 297. — *Prunus nitida* (Pierre) Koehne, Bot. Jahrb. 52 (1915) 298, *comb. illeg., non* Salisb. (1796); Card. *in* Fl. Gén. I.C. 2 (1920) 622, fig. 59. — *Prunus papuana* Koehne, Bot. Jahrb. 52 (1915) 299, *e descr.* — *Prunus scortechinii* (King) Koehne, Bot. Jahrb. 52 (1915) 298. — *Pygeum glabrifolium* Baker *f.*, J. Bot. 62 (1924) Suppl. p. 33, *nom. illeg.* — *Prunus nitens* Craib, Fl. Siam. Enum. 1 (1931) 565.

Typification. *Cerasus javanica, Prunus javanica, Laurocerasus javanica: Teysmann s.n.*, holotype prob. in BO *(non vidi)*, isotype in L (sheet 908.195-1176).

Prunus javanica var. *angustifolia: Korthals s.n.*, holotype in L.

Prunus junghuhniana: Junghuhn s.n., holotype in U, isotype seen from L.

Nelitris alternifolia, Decaspermum alternifolium: Zollinger 959, holotype in U, isotype seen from L. Reduced to *Prunus javanica* by Hallier *f.* (1917).

Cerasus martabanica, Prunus martabanica, Laurocerasus martabanica: Wallich 4902, holotype in K *(non vidi)*.

Prunus martabanica var. *scortechinii, Prunus scortechinii:* lectotype: *King's Coll. 5638*, holotype in CAL? *(non vidi)*, isotype seen from L; syntype: *Scortechini 1782 (non vidi)*.

Pygeum nitidum, Prunus nitida, Prunus nitens: Pierre 1717, holotype in P, isotype seen from L. *Pygeum nitidum* is not, as Koehne stated, a *nomen nudum*, although the description is short and does not give morphological characters, but only the dimensions of the tree and the properties of the timber.

Prunus forbesii: Forbes 2728, holotype probably lost in B, isotypes seen from A, L, SING. The same collection is also the type of *Pygeum glabrifolium nom. illeg.*

Prunus papuana: syntypes: *Schultze 43, 22 (non vidi)*, probably lost in B.

Tree, up to 35 m. *Twigs* glabrous, shoots with some small, caducous cataphylls at base, these not functioning as bud-scales. *Leaves* ovate to oblong-ovate, rarely lanceolate, 8—17(—19) by 3—6(—7) cm, index 2—3½(—4), base rounded to acute, apex tapering to long-acuminate, margin entire, densely black-punctate beneath, glabrous, herbaceous to slightly coriaceous; nerves 8—12 pairs, flat or slightly impressed above, slightly prominent to just visible beneath, venation not very distinct; basal glands (fig. 7 i, j) usually 2, small, on upper or lateral surface of petiole, usually just below blade, sometimes in the margin of the blade; petiole ½—1(—1½) cm. *Stipules* 4—5 by 1½—1½ mm, index 3—4, intrapetiolarly connate with their very excentric, keeled midribs, glabrous or ciliolate, caducous. *Racemes* solitary, in axils of usually already fallen leaves, 2—5 cm, up to 10 cm when in fruit; peduncle up to ½ cm; rachis glabrous or sparsely pubescent, rarely more densely so. *Bracts* up to 1½ mm long, glabrous outside, hairy inside and on margin, caducous, some empty ones present at the raceme-base. *Pedicels* 2—5(—7) mm, glabrous to sparsely pubescent. *Hypanthium c.* 2 mm high, glabrous outside or with some sparse hairs at base, rarely rather densely pubescent (Vietnam), on inside only with hairs on bottom, often only very few and short ones. *Perianth* 5-merous, rarely 6-merous; sepals triangular, ½—1 mm long, hairy especially at apex; petals elliptic to orbicular, 2½—4 mm long, 3—5 times as long as sepals, glabrous. *Stamens* 25—50; filaments up to 6 mm, glabrous; anthers 0.4—1 mm long. *Ovary* glabrous, sometimes with hairs around insertion; style up to 4½ mm, glabrous. *Fruits* (fig. 6 g) ovoid to ellipsoid, base rounded, apex acute, 15—23 by 7—12 mm, index 1.7—2.5, glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. Peninsular Burma (according to Kurz and others), Thailand (according

to Craib), S. Vietnam, S. Andaman, Sumatra (Tapanuli, Eastc., Palembang), Malaya (Kedah, Perak, Pahang) incl. Tioman I., Java (W. & C. Java only), Bali, Borneo (Sabah, Indonesian Borneo, also Bunguran I.), Palawan, Celebes (Minahasa, Bonthain), Moluccas (Sula Is, Buru), New Guinea (Vogelkop Penins., Hollandia). — Fig. 16.

Ecology. Primary and secondary forest, from sea-level up to 1200 m.

Compilation of field-notes. Small buttresses rarely recorded. From several notes emerges the following picture of the bark: redbrown to darkbrown, smooth, peeling, 1—4 mm, living bark *c.* 1 cm, slash cream to redbrown, with an almond-like smell. Sapwood light-coloured, heartwood brown to red. Flowers whitish. Fruits green when young, via yellow turning red. *Vernaculars:* several names reported only once, more reliable are *Djengot* (Java, Sundanese), *Sissemohi* (New Guinea, Manikion lang.). *Uses:* bark used for rice-bins (Borneo, once noted) and as vermicide (Borneo, once noted).

Remarks. With the endemic Bornean *P. mirabilis* this is the only species in Malesia with the leaves dark-punctate beneath, in that region consequently easy to recognize, also in Java, where it has been confused with *P. adenopoda* which, however, is more closely related to *P. zippeliana* (see under *P. adenopoda*, p. 46). In continental SE. Asia it could be confused with *P. phaeosticta* and *P. fordiana* which also have punctate leaves, but from those species it can be distinguished by the fruit, basal glands, and stipules (cf. key).

Pygeum nitidum is typified by a somewhat deviating specimen, *Pierre 1717*. The hypanthium in that specimen is considerably denser hairy than in other specimens.

14. Prunus mirabilis Kalkm., *spec. nov.*

Type: *Chew, Corner & Stainton 1097*, holotype in K, no isotypes seen.

A *Pruno javanica* differt floribus distincte maioribus (hypanthio 4 mm alto, sepalis 3 mm longis, petalis 7½ mm longis), drupa basi apiceque acuta, glandulis basalibus deficientibus.

Tree. *Twigs* glabrous, the shoots with some (2) stipular cataphylls at base. *Leaves* elliptic to elliptic-oblong, 10—15 by 4—6 cm, index 2—2½, base rounded, apex acuminate, margin entire, glabrous, coriaceous, lower surface dark-punctate; nerves 9—12 pairs, slightly impressed above, rather prominent beneath, venation reticulate, often a rather strong vein more or less parallel to the nerves; basal glands absent; petiole 1—1¼ cm. *Stipules* (few seen) *c.* 4 by 1½—2 mm, intrapetiolarly connate with their excentric keels, almost glabrous. *Racemes* solitary, in axils of fallen leaves, *c.* 3½ cm during anthesis (one seen), up to 14 cm when fruiting; peduncle ½ cm; rachis sparsely pubescent. *Bracts* not seen, the lower ones probably empty. *Pedicels* 4—6 mm during anthesis, up to 10 mm under the fruit, sparsely pubescent. *Hypanthium c.* 4 mm high, glabrous outside, only some hairs on bottom inside. *Perianth* (in the one flower examined) 6-merous; sepals rounded-triangular, 3 by 2 mm, ciliate, surfaces glabrous; petals orbicular, 7½ mm long, glabrous (sparsely ciliolate). *Stamens c.* 40; filaments up to 10 mm, glabrous; anthers 1 mm long. *Ovary* glabrous. *Fruits* ellipsoid, base and apex tapering, up to 22 by 11 mm, glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. Only known from two specimens collected in Borneo, on the eastern shoulder of Mt Kinabalu. — Fig. 16.

Ecology. One specimen from 1950 m, the other from a mossy forest on 2700 m alt.

Field-notes. Petals and filaments white. The fruits probably become red when ripe.

Remarks. This is a remarkable species with flowers which are conspicuously larger than in any other species of the subgenus, in which the petals never exceed 4 mm; here they are no less than 7½ mm long. Hypanthium and sepals are also large.

The relationship to *P. javanica* is obvious: both species have dark-dotted leaves, connate stipules, and ellipsoid, large fruits. Apart from the larger flowers there are some other differences: absence of basal glands, a more pronounced venation, and an acute base in the fruits. Also in the ecology the species differ conspicuously: *javanica* has been collected from 0—1200 m, the present species comes from higher altitude.

Only two specimens are known: the type (bearing flowers and young fruits), and *Chew, Corner & Stainton 163*, which comes from the same locality and bears almost mature fruits.

Sect. **Mesopygeum**

(Koehne) Kalkm., *comb. nov.* — *Pygeum* Gaertn., De Fruct. 1 (1788) 218, t. 46; Meisn., Pl. Vasc. Gen. (1837) 102, Comm. 72, Add. (1843) 354; Endl., Gen. Pl. (1840) 1250; Miq., Fl. Ind. Bat. 1, 1 (1855) 360; B. & H., Gen. Pl. 1 (1865) 610; Kurz, For. Fl. Brit. Burma 1 (1877) 435; Hook. *f.*, Fl. Brit. Ind. 2 (1878) 318; Boerl., Handl. 1[2] (1890) 427; Focke *in* Engl. & Pr., Nat. Pfl. fam. III, 3 (1891) 51; King, J. As. Soc. Beng. 66, 2 (1897) 286; Koehne, Bot. Jahrb. 51 (1913) 177, *incl.* sect. *Calopygeum* Koehne, l.c., p. 217, sect. *Cylopygeum* Koehne, l.c., p. 218, sect. *Heteropygeum* Koehne, l.c., p. 218, sect. *Leptopygeum* Koehne, l.c., p. 214, sect. *Mesopygeum* Koehne, l.c., p. 215, sect. *Saccopygeum* Koehne, l.c., p. 217, *et* sect. *Sericospermum* Koehne, l.c., p. 219, *excl.* sect. *Archopygeum* Koehne, *quoad pertinet ad sect. Laurocerasus sensu mihi;* Koehne, Bot. Jahrb. 52 (1915) 334; Card. *in* Fl. Gén. I.C. 2 (1920) 618; Ridl., Fl. Mal. Penins. 1 (1922) 672; Merr., Enum. Philip. 2 (1923) 232; Craib, Fl. Siam. Enum. 1 (1931) 566; Meeuse & Adelb. *in* Back., Bekn. Fl. Java (em. ed.) IV C 2 (1943) fam. 116, p. 23; Vidal, Not. Syst. 13 (1948) 294; Back. & Bakh. *f.*, Fl. Java 1 (1963) 520; Hutch., Gen. Flow. Pl. 1 (1964) 189. — *Dodecadia* Lour., Fl. Cochinch. (1790) 319, ed. Willd. (1793) 390. — *Polydontia* Bl., Bijdr. (1826) 1104; Don, Gard. Dict. 2 (1832) 516; Meisn., Pl. Vasc. Gen. (1837) 102, Comm. 72 *('Polyodontia');* Wight, Ill. Ind. Bot. 1 (1840) 203 *('Polyodontia');* Wight, Ic. 1 (1840) xlix *('Polyodontia').* — *Polystorthia* Bl., Fl. Jav. (1828) Praef. viii, *nom. superfl.* — *Germaria* Presl, Epim. Bot. (1851) 221, *nom. illeg., non Germaria* Presl *in* Sternb., Vers. Geogn.-Bot. Darst. Fl. Vorwelt (1838) 188. — *Prunus* sect. *Nothocerasus* Miq., Fl. Ind. Bat. 1, 1 (1855) 364, *pro min. parte.* — *Digaster* Miq., Sum. (1861) 129, 329.

Typification. *Pygeum: P. zeylanicum* Gaertn., correct name (see p. 55): *Prunus ceylanica* (Wight) Miq.

Dodecadia: D. agrestis Lour. According to Merr., Trans. Amer. Phil. Soc., n.s. 24, II (1935) 182, this is a *Pygeum.* I have not seen the specimen in BM, on which Merrill based his statement.

Polydontia, Polystorthia: Polydontia arborea Bl., transferred to *Pygeum* by C. Mueller (1857), correct name: *Prunus arborea* (Bl.) Kalkm. The genus *Polydontia* was considered synonymous with *Pygeum* already by Endlicher (1840) and by Meisner (1843), but neither of them made the required combinations. *Polystorthia* is only another, and superfluous name for *Polydontia.*

Germaria: G. latifolia Presl, in an illegitimate combination transferred to *Pygeum* by Rehder (1912), see p. 56.

Sect. *Nothocerasus: Pr. javanica* (T. & B.) Miq., see p. 30.

Digaster: D. sumatranus Miq., in the same volume (p. 619) by the author himself already transferred to *Pygeum.*

Sect. *Mesopygeum:* Koehne divided the genus *Pygeum* into eight sections, seven of which together make up the present section. The oldest name in *Pygeum, P. zeylanicum*

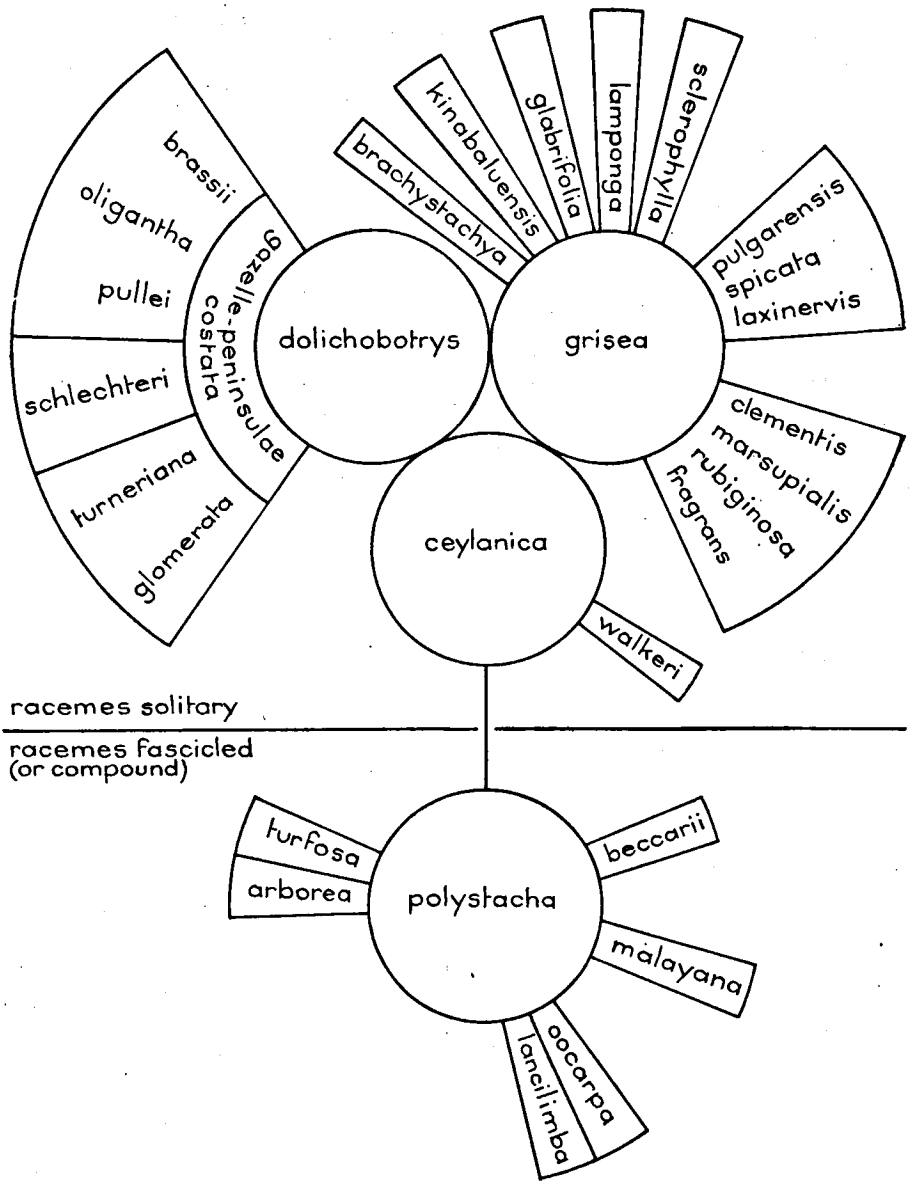

Fig. 17. Morphological relationships in Section *Mesopygeum*. Three species not entered in the diagram: *P. subglabra, versteeghii, wallaceana.*

Gaertn., was put by Koehne in the synonymy of *P. wightianum* Bl., because he was not sure about its identity and moreover considered it (wrongly!) to be a *nomen nudum*. Since he placed *P. wightianum* in his sect. *Mesopygeum*, this name has been chosen from among the seven, as the sectional epithet. The type species of the section is *Pygeum wightianum* Bl., a heterotypic synonym of *Pygeum zeylanicum* Gaertn., and a homotypic synonym of *Polydontia ceylanica* Wight and *Prunus ceylanica* (Wight) Miq., which latter name is also the correct one.

Trees or shrubs. *Leaves* always entire; basal glands on the lower surface of the blade, flat or hollowed, additional glands usually present, near the margin. *Racemes* solitary, in bundles, or (rarely) compound. *Flowers* small, not rarely functionally male. *Perianth segments* 5—14, in most species subequal, sometimes sepals and petals distinct in shape and texture, but petals at most 1½ (very rarely up to 2) times as long as sepals. *Stamens* 10—85. *Ovary* glabrous or hairy. *Fruits* usually transversely ellipsoid or didymous, sometimes (sub)globose, in few species *(fragrans, lancilimba, oligantha, oocarpa)* distinctly longer than wide; seedcoat often hairy.

Distribution. 34 species in tropical Asia, from India to New Guinea and the Solomon Is, one species also in Queensland. — Fig. 10.

Ecology. Forests and more open vegetation, from sea-level up to 3700 m alt.

Remarks. In the diagram of fig. 17 it has been tried to picture the morphological relationships within the section. *P. ceylanica, grisea,* and *dolichobotrys* form a trio of related species, with many species grouped around two of them. Related to *P. ceylanica* is *P. polystachya* which is considered to be also a central species, viz. the one around which the species with fascicled racemes are grouped.

15. Prunus ceylanica (Wight) Miq., Fl. Ind. Bat. 1, 1 (1855) 366; C. Muell. *in* Walp., Ann. 4 (1857) 652. — *Pygeum zeylanicum* Gaertn., Fruct. 1 (1788) 218, t. 46; Bedd., Fl. Sylv. 1 (1870) 59, pl. 59; *ibid.* 3 (For. Man.) (1872) xcvii (two latter '*ceylanicum*'). — *Pygeum acuminatum* Colebr., Trans. Linn. Soc. 12 (1818) 360, t. 18; Colebr., Isis (1825) 818; Walp., Rep. 2 (1843) 8; C. Muell. *in* Walp., Ann. 4 (1857) 642; Kurz, J. As. Soc. Beng. 45, 2 (1877) 303; Kurz, For. Fl. Brit. Burma 1 (1877) 435; Hook. *f.*, Fl. Brit. Ind. 2 (1878) 318; King, J. As. Soc. Beng. 66, 2 (1897) 289; Koehne, Bot. Jahrb. 51 (1913) 182; Gamble, Fl. Pres. Madras 3 (1919) 438. — *Polydontia? ceylanica* Wight, Ill. Ind. Bot. 1 (1840) 203 *('Polyodontia');* Wight, Ic. 1 (1840) xlix, pl. 256 *('Polyodontia').* — *Pygeum wightianum* Bl. *ex* C. Muell. *in* Walp., Ann. 4 (1857) 642; Bedd., Fl. Sylv. 3 (For. Man.) (1872) xcvii; Hook. *f.*, Fl. Brit. Ind. 2 (1878) 319; Trim., Fl. Ceyl. 2 (1894) 134; Willis, Rev. Cat. Ceyl. (1911) 31; Koehne, Bot. Jahrb. 51 (1913) 180; Gamble, Fl. Pres. Madras 3 (1919) 439; Alston, Fl. Ceyl. (Suppl.) (1931) 101. — *Pygeum wightianum* var. *parvifolium* Thw. *ex* Hook. *f.*, Fl. Brit. Ind. 2 (1878) 319; Willis, Rev. Cat. Ceyl. (1911) 31. — *Pygeum gardneri* Hook. *f.*, Fl. Brit. Ind. 2 (1878) 321; Talbot, For. Fl. Bombay 1 (1909) 505, fig. 286, 287; Koehne, Bot. Jahrb. 51 (1913) 181; Fyson, Fl. Nilg. Puln. Hill Tops 1 (1915) 130 *et* 3 (1920) 41, fig. 324; Gamble, Fl. Pres. Madras 3 (1919) 439. — *Pygeum glaberrimum* Hook. *f.*, Fl. Brit. Ind. 2 (1878) 319. — *Pygeum parvifolium* (Hook. *f.)* Koehne, Bot. Jahrb. 51 (1913) 179; Alston, Fl. Ceyl. (Suppl.) (1931) 101. — *Pygeum plagiocarpum* Koehne, Bot. Jahrb. 51 (1913) 180; Alston, Fl. Ceyl. (Suppl.) (1931) 101. — *Pygeum tenuinerve* Koehne, Bot. Jahrb. 51 (1913) 180. — *Pygeum sisparense* Gamble, Kew Bull. (1918) 238; Gamble, Fl. Pres. Madras 3 (1919) 438. — *Pygeum parviflorum (non* T. & B.) Craib, Fl. Siam. Enum. 1 (1931) 567. — *Pygeum apiculatum* Vidal, Not. Syst. 13 (1948) 294, *pro parte, typo excl.* — *Pygeum cochinchinense* Vidal, Not. Syst. 13 (1948) 295.

Typification. *Polydontia ceylanica, Prunus ceylanica, Pygeum wightianum: Wight (s.n.?)* from 'above Numbady', probably in PDA, *non vidi. Wight 293* (E) is probably also an authentic specimen.

Pygeum zeylanicum: König 6404, holotype in L (fruits only), no isotypes seen.

Pygeum acuminatum: not cited by Colebrooke, only 'Bengal (at Silhet)', probably in BM, *non vidi.*

Pygeum wightianum var. *parvifolium* and *Pygeum parvifolium: Thwaites C.P. 1596*, holotype in K, isotypes seen from A, BR, CAL, P.

Pygeum gardneri: lectotype: *Wight 908*, holotype in K, no isotypes seen; syntypes: *Gardner s.n.* from 'Nulgherries' (K), *Ritchie s.n.* from Bombay *(non vidi).*

Pygeum glaberrimum: lectotype: *Hooker & Thomson s.n.* from Chittagong, holotype in K, isotypes seen from BM, CAL, L, P; syntypes: *Hooker s.n.* from Sikkim (A, BM, CAL, K, P), *Simmonds s.n.* from Khasia *(non vidi).* Koehne, Bot. Jahrb. 51 (1913) 177 stated that the type of *glaberrimum* is a *mixtum* and therefore discarded the name. Not the type specimens, however, are mixed, but another specimen, viz. *Hooker & Thomson s.n.* from Khasia, and that only in L.

Pygeum plagiocarpum: Thwaites C.P. 638, holotype in B? (lost), lectotype in K, isotypes seen from A, BO, BR, CAL, P.

Pygeum tenuinerve: Moon s.n., holotype in L, sterile.

Pygeum sisparense: lectotype: *Gamble 14339*, holotype in K, no isotypes seen; syntypes: *Gamble 14472* (CAL, K), *20582 (non vidi), 20637 (non vidi).*

Pygeum apiculatum: from the cited specimens *Poilane 7530* is the present species. The lectotype *Poilane 7152* is *Prunus grisea* var. *tomentosa.*

Pygeum cochinchinense: Poilane 803, holotype in P, no isotypes seen.

Tree up to 24 m. *Twigs* pubescent when very young, rapidly glabrescent. *Leaves* elliptic-oblong or oblong to ovate or ovate-lanceolate, 6—18 by 3—9 cm, in Ceylon down to 4 by 1½ cm, index 2—3, base acute or rounded and then usually decurrent, apex usually acuminate, rarely obtuse, glabrous above, sometimes pubescent beneath when very young, but rapidly glabrescent, usually rather thin and herbaceous, sometimes more coriaceous; nerves 5—9 pairs, impressed to flat above, prominent beneath, venation usually inconspicuous; basal glands (0—)2(—4), flat, often rather large, additional glands usually present, few, flat; petiole ¾—2 cm, in Ceylon ½—1 cm, pubescent when young, glabrescent. *Stipules* 3½—8(—12) by ½—1½ mm, index 3½—7(—10), pubescent outside, sparsely so to glabrous inside, margin sometimes distinctly glandular. *Racemes* solitary, in axils of leaves or their scars, 3—11 cm (down to 2 cm in Ceylon); peduncle usually *c.* ½ cm; rachis pubescent. *Bracts* caducous, up to 1½ mm long, hairy outside, (sub)glabrous inside, lowermost ones sterile and sometimes tripartite. *Pedicels* 1—4 (—5) mm, pubescent. *Hypanthium* 1½—2 mm high, pubescent outside, on inside with hairs on bottom and sometimes also higher up. *Perianth* (fig. 1 d) usually definitely recognizable as sepals and petals, 5-merous, rarely 4- or 6-merous, very rarely the perianth segments more equal; sepals triangular, 0.6—1 mm long; petals elliptic to orbicular, 0.8—1.4 mm long. *Stamens c.* 20—40, in Ceylon only 10—20; filaments up to 4 mm, glabrous; anthers 0.3—0.5 mm long. *Ovary* with a ring of hairs around insertion, otherwise glabrous or with some few hairs; style up to 5 mm. *Fruits* (fig. 6 a) transversely ellipsoid to didymous, very variable in dimensions, (8—)9—18 by (12—)14—25 mm, 1.2—1.7 times as wide as long, glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. Ceylon, India (Bombay, Kerala, Mysore, Madras, Andhra Pradesh, Orissa, Uttar Pradesh, West Bengal, Sikkim, Assam), E. Pakistan (Sylhet, Chittagong), Burma (Katha, Minbu, Pegu, Rangoon, Moulmein, Tenasserim), Thailand (Prachinburi,

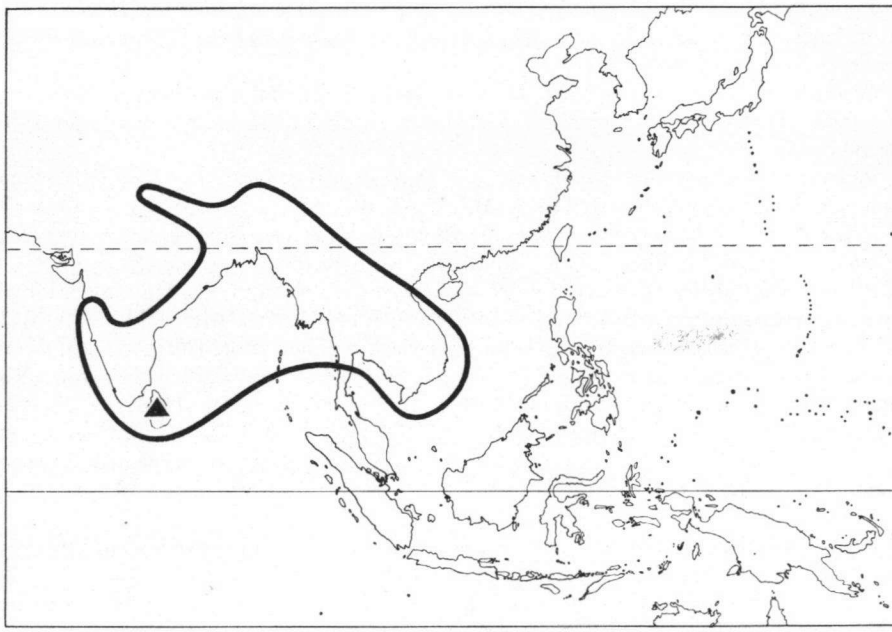

Fig. 18. Distribution of 15. *P. ceylanica* (————) and 16. *P. walkeri* (▲).

Chanthaburi), Laos (Luang Prabang, Bassac), S. Vietnam (Annam: Quang Tri, Tourane, Djiring; Cochin-China: Budop, Bien Hoa), Andaman Is (S. Andaman). — Fig. 18.

Ecology. Forest, 0—1500 m, in India and Ceylon sometimes up to 2100 m.

Compilation of field-notes. Bark grey to brownish grey, (rather) smooth, 6—10 mm, blaze brown, darkening after exposure, smelling strongly like almonds. Wood white, soft and light according to some notes, but once noted: very hard and durable. Few data available on this point, but the latter seems not probable. Flowers white or whitish. Fruits green, then red, purple, ultimately black, kernel smelling and tasting like bitter almonds. Most *vernaculars* noted only once, twice reported are: *Daka* (Bombay), *Kalicut* (Nepalese), *Op chôi* (Thailand). *Uses:* some few collectors mention use of the timber. Bark, according to *Poilane 803*, used by the Moïs in S. Vietnam against stomach-ache, also providing a beverage, 'sembable au thé mais d'un goût différent et à mon avis beaucoup plus agréable'.

Remarks. The present species is related to *P. grisea* from which it chiefly differs in the distinctly biseriate perianth and in the larger fruits. Some specimens from Annam connect *ceylanica* with *grisea* var. *tomentosa* which, however, can be distinguished *i.a.* by its shorter racemes. It is not impossible that future collections from the area in which the said species both occur (i.e. Burma, Thailand, Vietnam) will make the boundary less distinct, but at present I prefer to keep them apart.

The specimens from Ceylon have, as stated in the description, small leaves and few stamens. The type of *P. parvifolium* represents the lower limit, but in view of the overlap in those characters I do not think that a variety is warranted here.

In Thailand the specimen *Put 3043* from Krat is a representative of a deviating popula-

tion with larger flowers and more stamens (—60). *Kerr 9403* from the same region (with fruits) probably belongs to this same form which is not included in the description, since the position is still unclear.

In Ceylon two species have been nomenclatorally (not taxonomically) confused by Hooker, Trimen, Willis, and Alston. One of the Ceylonese species has a glabrous ovary and glabrous leaves, this was called *Pygeum wightianum* by the authors mentioned above; the other species has the ovary and the under-surface of the leaves hairy, this was called *Pygeum zeylanicum*. Application of Gaertner's epithet *zeylanicum*, however, was incorrect: examination of his description and drawings and of the type specimen in Leiden reveal that Gaertner described a species with entirely glabrous fruits which must have originated from glabrous ovaries. *Polydontia ceylanica* Wight is according to description and plate the same species, but the epithet *ceylanica* Wight is not based on *zeylanicum* Gaertn., although in the same year as Wight's publications (1840) Endlicher recognized the identity of *Polydontia* and *Pygeum*. The correct name for the glabrous species, when transferred to *Prunus*, must be *P. ceylanica* Miq. based on Wight's *Pol. ceylanica*. The older epithet *acuminatum* Colebr. is not available because of the North American *P. acuminata* Michx (1803). The correct name for the hairy species is *P. walkeri*, see below.

16. Prunus walkeri (Wight) Kalkm., *comb. nov.* — *Polydontia? walkeri* Wight, Ill. Ind. Bot. 1 (1840) 203 (*'Polyodontia' 'walkirii'* in descr., *'walkerrii'* in index). — *Pygeum walkeri* (Wight) Bl. *ex* C. Muell. *in* Walp., Ann. 4 (1857) 642 (*'walkerii'*); Koehne, Bot. Jahrb. 51 (1913) 181 (*'walkerii'*). — *Pygeum zeylanicum (non* Gaertn.) Hook. *f.*, Fl. Brit. Ind. 2 (1878) 321 (*'ceylanicum'*); Trim., Fl. Ceyl. 2 (1894) 135; Willis, Rev. Catal. Ceyl. (1911) 31; Alston, Fl. Ceyl. (Suppl.) (1931) 101.

Typification. *Polydontia walkeri, Pygeum walkeri: Walker s.n.*, holotype probably in PDA *(non vidi)*, isotype seen from E.

Tree. *Twigs* woolly pubescent when young, glabrescent. *Leaves* ovate or oblong-ovate, 10—18 by 5—9 cm, index 1¾—2½, base rounded, apex gradually tapering to acuminate, herbaceous, rather hard when dry, glabrous above except usually on midrib, pubescent beneath, especially on the nerves; nerves 7—9 pairs, flat to slightly impressed above, prominent beneath, venation inconspicuous; basal glands 2, flat, additional glands usually several, flat, rather large; petiole *c.* 1 cm, woolly pubescent, glabrescent. *Stipules* 5—6 by 1—1½ mm, index 4—6, densely hairy outside, some hairs inside, margin glandular. *Racemes* solitary, in axils of extant or fallen leaves, up to 7 cm, in fruit up to 10 cm; peduncle up to ½ cm; rachis pubescent. *Bracts* ¾—1 mm long, hairy, caducous. *Pedicels* up to 3 mm, pubescent. *Hypanthium* 1—1½ mm high, pubescent outside, on inside the whole surface sparsely long-hairy. *Perianth segments* 6—10, subequal in open flowers, but in bud more or less distinctly biseriate, up to 1 mm long. *Stamens* 12—17; filaments up to 4½ mm, glabrous; anthers 0.3—0.5 mm long. *Ovary* densely hairy; style up to 4½ mm, glabrous. *Fruits* (only two seen) transversely ellipsoid, 15—16 by 22—24 mm, woolly pubescent; endocarp glabrous; seedcoat glabrous.

Distribution. Ceylon. — Fig. 18.

Ecology. Hardly any data. The altitude mentioned on three of the six specimens examined: 500, 800, 900 m.

Compilation of field-notes. The vernacular *Kunkumbal ketuja* or *K. letiya* was noted twice by Worthington.

Remarks. To be distinguished from *P. ceylanica* by the more pubescent leaves and the hairy ovary and fruit. See under said species for the application of the two names.

17. Prunus grisea (C. Muell.) Kalkm., *comb. nov.* — *Germaria latifolia* Presl, Epim. Bot. (1851) 221. — *Pygeum latifolium* Miq., Pl. Jungh. (1855) 401; Miq., Fl. Ind. Bat. 1, 1 (1855) 361; C. Muell. *in* Walp., Ann. 4 (1857) 641; Vidal, Phan. Cuming. (1885) 70, 111; K. & V., Bijdr. 5 (1900) 355, *incl.* var. *genuinum* K. & V., l.c., p. 356, 360 (*'forma genuina'*), *incl.* var. *nervosum* K. & V., l.c., p. 357, 360 (as forma) (*'nervosa'*), *incl.* var. *tomentosum* K. & V., l.c., p. 358, 360 (as forma) (*'tomentosa'*), *incl.* var. *tomentosum* forma *lanceolatum* K. & V., l.c., 359 (*'lanceolata'*); Merr., Philip. J. Sc. 1 (1906) Suppl. 60; Back., Schoolfl. Java (1911) 449; Koord., Exk. Fl. Java 2 (1912) 336; Koord., Atlas 1 (1913) pl. 114, 115; Koehne, Bot. Jahrb. 51 (1913) 195, *incl.* var. *nervosum* K. & V. — *Pygeum griseum* Bl. *ex* C. Muell. *in* Walp., Ann. 4 (1857) 642; Koehne, Bot. Jahrb. 51 (1913) 197. — *Pygeum confusum* Bl. *ex* C. Muell. *in* Walp., Ann. 4 (1857) 642. — *Pygeum celebicum* Miq., Ann. Mus. Bot. Lugd.-Bat. 1 (1864) 212; Koehne, Bot. Jahrb. 51 (1913) 207. — *Pygeum persimile (non* Kurz 1872) Kurz, J. As. Soc. Beng. 45, 2 (1877) 303; Kurz, For. Fl. Brit. Burma 1 (1877) 436. — *Pygeum lanceolatum* Hook. *f.*, Fl. Brit. Ind. 2 (1878) 319; King, J. As. Soc. Beng. 66, 2 (1897) 289; Koehne, Bot. Jahrb. 51 (1913) 187, *incl.* var. *valetonianum* Koehne, l.c., 194; Ridl., Fl. Mal. Penins. 1 (1922) 674, *incl.* var. *maingayi* (Hook. *f.*) Ridl., l.c.; Craib, Fl. Siam. Enum. 1 (1931) 567. — *Pygeum maingayi* Hook. *f.*, Fl. Brit. Ind. 2 (1878) 319; King, J. As. Soc. Beng. 66, 2 (1897) 288; Koehne, Bot. Jahrb. 51 (1913) 187. — *?Pygeum brevistilum* K. Sch. *in* K. Sch. & Hollr., Fl. Kais. Wilh. land (1889) 93; K. Sch. & Laut., Fl. Schutzgeb. (1900) 340; Koehne, Bot. Jahrb. 51 (1913) 209. — *Pygeum hookerianum* King, J. As. Soc. Beng. 66, 2 (1897) 293; Koehne, Bot. Jahrb. 51 (1913) 187; Ridl., Fl. Mal. Penins. 1 (1922) 676. — *Pygeum preslii* Merr., Philip. J. Sc. 3 (1908) Bot. 227; Elm., Leafl. Philip. Bot. 5 (1913) 1621; Koehne, Bot. Jahrb. 51 (1913) 203, *incl.* var. *latifolium* (Presl) Koehne, l.c., 204, *et* var. *vulgare* Koehne, l.c., 203; Hayata, Ic. Pl. Formos. 3 (1913) 87; Koehne, Bot. Jahrb. 52 (1915) 337; Merr., Enum. Philip. 2 (1923) 233; Kaneh., Formos. Trees, 2nd ed. (1936) 273; Li, Woody Fl. Taiw. (1963) 288. — *Pygeum latifolium* (Presl) Rehd., Bradl. Bibliogr. 2 (1912) 278, *comb. illeg.* — *Pygeum gitingense* Elm., Leafl. Philip. Bot. 5 (1913) 1625; Koehne, Bot. Jahrb. 52 (1915) 335; Merr., Enum. Philip. 2 (1923) 233. — *Pygeum latiphyllum* Elm., Leafl. Philip. Bot. 5 (1913) 1622. — *Pygeum microphyllum* Elm., Leafl. Philip. Bot. 5 (1913) 1626; Koehne, Bot. Jahrb. 52 (1915) 335. — *?Pygeum albivenium* Koehne, Bot. Jahrb. 51 (1913) 209. — *Pygeum decipiens* Koehne, Bot. Jahrb. 51 (1913) 204; Merr., Enum. Philip. 2 (1923) 232. — *Pygeum koordersianum* Koehne, Bot. Jahrb. 51 (1913) 194. — *Pygeum membranaceum* Koehne, Bot. Jahrb. 51 (1913) 195. — *Pygeum neglectum* Koehne, Bot. Jahrb. 51 (1913) 196. — *Pygeum timorense* Koehne, Bot. Jahrb. 51 (1913) 202, *pro parte, typo incl.* — *Pygeum costatum (non* Hemsl.) Koehne, Bot. Jahrb. 52 (1915) 339. — *Pygeum vulgare* (Koehne) Merr., Enum. Philip. 2 (1923) 234. — *Pygeum velutinosum* Ridl., Fl. Mal. Penins. 5 (1925) 306. — *Pygeum kingianum* Craib, Kew Bull. (1930) 161; Craib, Fl. Siam. Enum. 1 (1931) 567. — *Pygeum havilandii* Ridl., Kew Bull. (1938) 281. — *Pygeum hookerianum* King var. *borneense* Ridl., Kew Bull. (1938) 281. — *Pygeum melanocarpum* Merr. & Perry, J. Arn. Arb. 21 (1940) 191. — *Pygeum parviflorum (non* T. & B.) Meeuse & Adelb. *in* Back., Bekn. Fl. Java (em. ed.) IV C 2 (1943) fam. 116, p. 23, *pro parte.* — *Pygeum apiculatum* Vidal, Not. Syst. 13 (1948) 294, *pro parte, typo incl.* — *Pygeum longistylum* Vidal, Not. Syst. 13 (1948) 295. — *Pygeum arboreum (non* C. Muell.) Back. & Bakh. *f.*, Fl. Java 1 (1963) 520, *pro parte.*

Tree or shrub. *Twigs* pubescent to puberulous, rapidly glabrescent. *Leaves* usually elliptic to oblong, sometimes ovate to lanceolate, 2—20 by 1—9 cm, index 1½—3½, base rounded or acute, apex usually acuminate, sometimes (in var. *microphylla* and in New Guinea specimens of var. *grisea)* obtuse, sparsely pubescent to glabrous on both

sides; nerves (4—)5—9(—11) pairs, flat to impressed above, prominent to prominulous beneath, venation inconspicuous to invisible; basal glands 2 (0—4), flat, additional glands usually present; petiole ¼—1½(—2) cm, pubescent to puberulous, more or less glabrescent. *Stipules* 1½—8 by ¼—1¾ mm, index 2—8(—12), pubescent to glabrous outside, usually glabrous inside, margin usually glandular (in Philippine specimens of var. *grisea* sometimes distinctly glandular-serrate). *Racemes* solitary, in axils of extant or fallen leaves, ½—6½ cm; peduncle 0—1 cm; rachis (sparsely) pubescent. *Bracts* up to 2½ mm, usually caducous, the basal ones often with tridentate apex, in Philippine specimens of var. *grisea* the bracts sometimes large, up to 9 mm long. *Pedicels* 0—7 mm, (sparsely) pubescent. *Hypanthium* 1½—4 mm high, pubescent outside, sometimes only sparsely so, entirely glabrous inside or with hairs on bottom. *Perianth segments* 6—13, subequal, or more or less distinctly differentiated as sepals and petals, ½—2 mm long. *Stamens* 15—50; filaments up to 6 mm, glabrous; anthers ¼—¾ mm long, in var. *microphylla* rarely longer. *Ovary* usually glabrous, but sometimes with some hairs, rarely (Java specimens of var. *grisea* especially) distinctly hairy; style up to 7 mm. *Fruits* globular to transversely ellipsoid, 6—13 by 7—16 mm, sometimes distinctly or indistinctly pointed (var. *tomentosa*), glabrous or almost so; endocarp glabrous or sparsely hairy; seedcoat glabrous.

Distribution. Peninsular Burma, Thailand, S. Vietnam, throughout Malesia, also on Taiwan? — Fig. 19.

Remarks. This is a very complex species which in its large area displays a considerable variability. It is most closely related to *P. ceylanica* from the Asiatic continent and to *P. dolichobotrys* from New Guinea. The differences are stated in the key to the species, p. 29.

As was pointed out by Merrill (1906), *Pygeum latifolium* Miquel (1855) was not based on *Germaria latifolia* Presl (1851), but on an entirely different type. None of those oldest epithets, however, is available in *Prunus*, because of *P. latifolia* Moench (1785) from America.

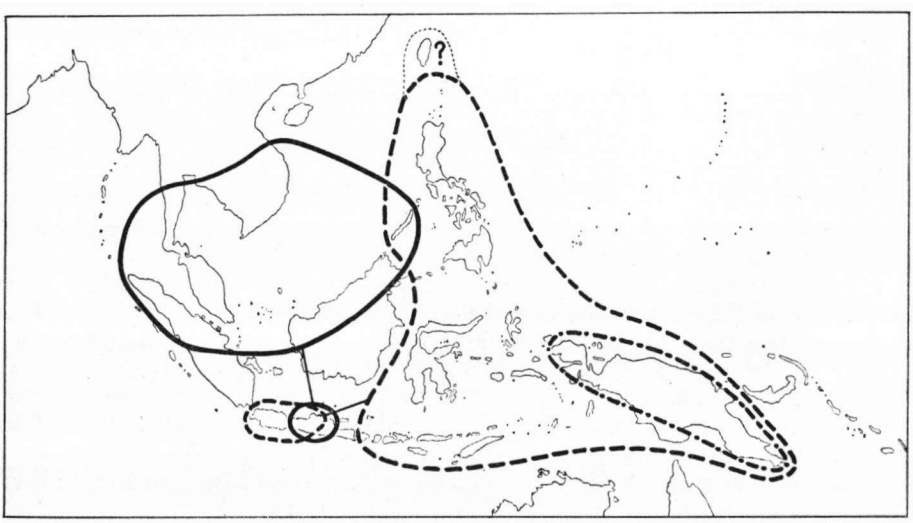

Fig. 19. Distribution of 17. *P. grisea* var. *grisea* (— — — —), var. *tomentosa* (————), var. *microphylla* (—.—.—).

Within the species I have distinguished three varieties, chiefly differing in dimensions of leaves, racemes and pedicels.

KEY TO THE VARIETIES

1. Racemes ½—1(—2½) cm, dense. Pedicels 0—1(—2) mm. Leaves usually papyraceous, thin. **b. var. tomentosa**
1. Racemes 2—7 cm, loose. Pedicels 1—7 mm. Leaves herbaceous or coriaceous.
2. Fully developed leaves not more than 7 cm long. . . . . **c. var. microphylla**
2. Fully developed leaves at least 8 cm long.. . . . . **a. var. grisea**

a. var. grisea

Germaria latifolia Presl — *Pygeum latifolium* Miq., *excl.* var. *tomentosum* K. & V. — *Pygeum griseum* C. Muell. — *Pygeum confusum* C. Muell. — *Pygeum celebicum* Miq. — ?*Pygeum brevistilum* K. Sch. — *Pygeum preslii* Merr. — *Pygeum latifolium* (Presl) Rehd. — *Pygeum gitingense* Elm. — *Pygeum latiphyllum* Elm. — *Pygeum decipiens* Koehne — *Pygeum lanceolatum* Hook. *f.* var. *valetonianum* Koehne — *Pygeum neglectum* Koehne — *Pygeum timorense* Koehne — *Pygeum costatum (non* Hemsl.) Koehne — *Pygeum vulgare* (Koehne) Merr. —. *Pygeum melanocarpum* Merr. & Perry — *Pygeum parviflorum (non* T. & B.) Meeuse & Adelb., *pro parte.* — *Pygeum arboreum (non* C. Muell.) Back. & Bakh. *f., pro parte.* — For full references, see under the species.

Typification. *Germaria latifolia, Pygeum latifolium* Rehd., *Pygeum preslii, Pygeum preslii* var. *latifolium: Cuming 1815,* holotype in K, isotype seen from BM.

Pygeum latifolium Miq.: *Junghuhn 107,* holotype in U, isotype seen from L.

Pygeum griseum: Mueller cited 'Kitungula' from Java. The only specimen that can be considered to be the type, is *Kuhl & v. Hasselt s.n.,* in L (sheet nr. 908.197-535).

Pygeum confusum: type not indicated, lectotype: *Blume s.n.* in L (sheet nr. 908.197-543).

Pygeum celebicum: Teysmann 5852, holotype in U, isotypes seen from BO, CAL, L.

Pygeum brevistilum: Hollrung 660, holotype in B (lost), isotypes seen from BO, K, P.

Pygeum latifolium var. *nervosum:* not typified by the authors.

Pygeum gitingense: Elmer 12137, holotype in PNH (lost), lectotype in US, further isotypes seen from A, BM, BO, CAL, E, K, L, P.

Pygeum latiphyllum: Elmer 11828, holotype in PNH (lost), lectotype in US, further isotypes seen from A, BO, BM, CAL, E, K, L, P.

Pygeum decipiens: lectotype: *Elmer 11095,* holotype in L, isotypes seen from A, BM, BO, K, US; syntype: *Elmer 11910* (A, BM, BO, CAL, E, L, P, US).

Pygeum lanceolatum var. *valetonianum:* lectotype: *Koorders 24125β,* holotype in L, isotypes seen from BO, CAL; syntype: *Koorders 6401β* (BO, L). For the species itself, see under var. *tomentosa.*

Pygeum neglectum: lectotype: *Teysmann s.n.,* holotype in L (sheet nr 908.197-514), isotype seen from P; syntypes: *Koorders 6400β* (BO, L), *12670β* (BO, CAL, L), *12671β* (L).

Pygeum timorense: lectotype: *Forbes 3905,* holotype in L, isotypes seen from BM, BO; syntype: *Forbes 3680* (BO, L). The third specimen cited by Koehne *(Forbes 3678)* is *P. arborea* var. *robusta.*

Pygeum preslii var. *vulgare, Pygeum vulgare: Borden FB 1806,* holotype in PNH (lost), lectotype in US, further isotypes seen from BM, BO, E, K, P, SING.

Pygeum melanocarpum: Brass 11532, holotype in A, isotypes seen from BO, L; paratypes: *Brass 11531* (A, BO, L), *Brass & Versteegh 10480* (BO, L).

Tree of up to 40 m. *Leaves* elliptic to oblong, or ovate to lanceolate, 5—20 by 2½—9 cm, index 1½—3(—4), apex tapering to (long-)acuminate, in New Guinea specimens rarely

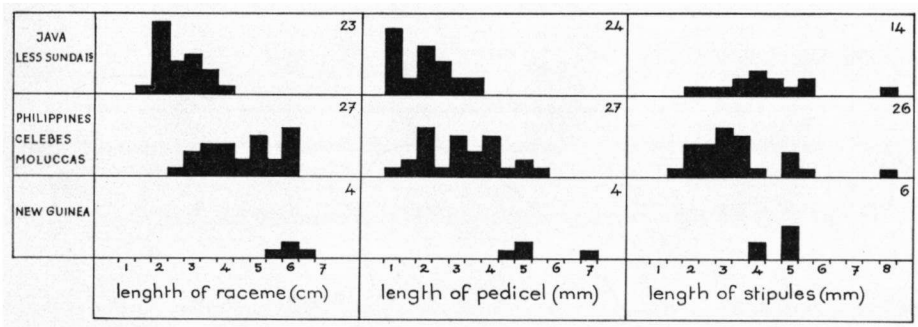

Fig. 20. Histograms for some characters in *P. grisea* var. *grisea*. Maximal values are entered for all specimens in which the character could be observed. Number of specimens in upper righthand corner.

obtuse, herbaceous or more or less coriaceous; basal glands usually 2, rarely 0, in New Guinea sometimes 4. *Racemes* 1½—6½ cm. *Pedicels* 1—7 mm. *Hypanthium* 2—4 mm high. *Perianth segments* 6—13, subequal, sometimes more or less regularly divided into sepals and petals, especially in specimens from New Guinea, up to 2 mm long, but usually smaller. *Ovary* glabrous, more rarely with some hairs, in Java and the Lesser Sunda Islands sometimes densely hairy. *Fruits* globular to transversely ellipsoid, 6—13 by 8—16 mm; fruiting-calyx in New Guinea large (3—5 mm across), but elsewhere up to 2 mm.

Distribution. Java (no certain specimens from east of Rembang), Kangean, Lesser Sunda Islands (Bali, Timor), Philippines (Luzon, Mindoro, Sibuyan, Cebu, Bohol, Leyte, Mindanao, Palawan), Celebes (N. and S. Penins.), Moluccas (Buru, Ambon, Key), New Guinea (several places in the highlands, scattered over the whole island), according to Hayata, Kanehira, and Li also on Taiwan. — Fig. 19.

Ecology. Primary and secondary forest, 0—*c.* 3000 m (only in New Guinea often collected above 2000 m, elsewhere rarely from such altitudes).

Compilation of field-notes. Small buttresses sometimes reported. Bark grey-brown, rather smooth, 5—20 mm, inner bark yellowish, blaze brown, strongly smelling of bitter almonds. Sapwood whitish to lightbrown, heartwood redbrown to darkbrown. Flowers whitish to cream, a more extensive note *(v. Steenis 5230)* says: 'disc yellow, style and filaments white, stigma and anthers lightbrown.' Fruits green when young, turning yellowish to white, red, purple, finally black. *Vernaculars:* in Philippines *Lago* (Tagalog language) several times reported, in Bukid language twice *Tanga* or *Tunga*. In Java *Kawojang* (Sundanese) and *Huru* (sometimes *Wuru*) with different suffixes (cf. *P. arborea* var. *arborea*). *Uses:* rarely reported as a timber tree.

Remarks. The principal components of this variety are the former *Pygeum latifolium* from Java, *P. preslii* from the Philippines, and *P. melanocarpum* from New Guinea. Although there are certainly several differences between populations of the different islands, it is quite impossible to separate them. Some of the differences have been graphically displayed in figs. 20 and 21. The many other synonyms are all representatives of minor variations.

In Java as well as in the Philippines the differences in form of leaf and leaf-base have been used for specific and infraspecific subdivision. This is an unpractical procedure because of the many intermediate and dubious specimens.

The ovaries are normally glabrous, but throughout the area specimens are found

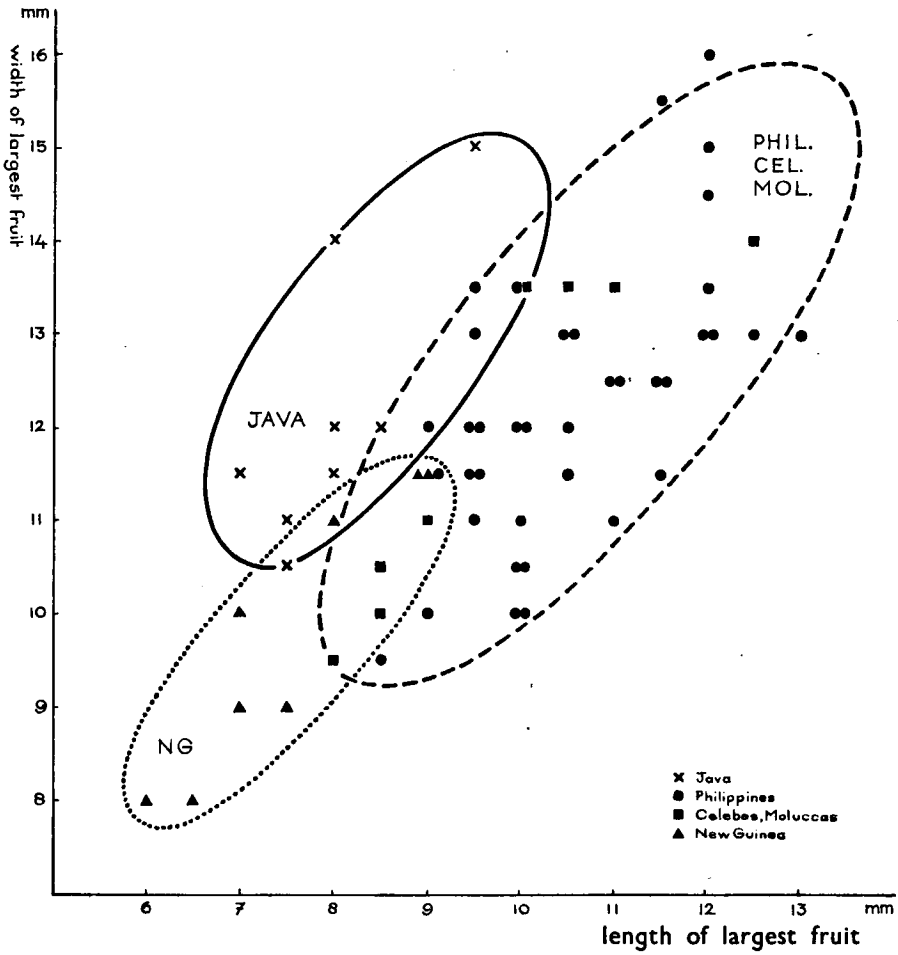

Fig. 21. Fruits of *P. grisea* var. *grisea*, scatterdiagram. Each dot represents a specimen with mature fruits, the largest fruit on the specimen being measured.

in which the ovary is more or less densely hairy. The transitions are very gradual, and it is not possible to make a fruitful taxonomic use of this character.

In Java the species has lately been confused with *P. arborea* (var. *arborea* and var. *robusta)* from which it is always to be distinguished by the solitary racemes and the glabrous seedcoat.

A dubious synonym is *Pygeum steinii* v. Malm, see p. 106.

b. var. **tomentosa** (K. & V.) Kalkm., *comb. nov.*

Pygeum persimile (non Kurz 1872) Kurz 1877. — *Pygeum lanceolatum* Hook. *f., excl.* var. *valetonianum* Koehne, *incl.* var. *maingayi* Ridl. — *Pygeum maingayi* Hook. *f.* — *Pygeum hookerianum* King, *incl.* var. *borneense* Ridl. — *Pygeum latifolium* Miq. var. *tomentosum* K. & V., *incl.* forma *lanceolatum* K. & V. — *Pygeum microphyllum* Elm. — *Pygeum*

koordersianum Koehne — *Pygeum membranaceum* Koehne — *Pygeum velutinosum* Ridl. — *Pygeum kingianum* Craib — *Pygeum havilandii* Ridl. — *Pygeum parviflorum (non* T. & B.) Meeuse & Adelb., *pro parte* — *Pygeum apiculatum* Vidal — *Pygeum longistylum* Vidal — *Pygeum arboreum (non* C. Muell.) Back. & Bakh. *f., pro parte.* — For full references see under the species. — **Fig. 22.**

Typification. *Pygeum persimile:* see under *Prunus arborea* var. *arborea*, p. 93.

Pygeum lanceolatum: Lobb 328, holotype in K, isotype seen from BM. For var. *valetonianum*, see under var. *grisea*, p. 58.

Pygeum maingayi, *Pygeum lanceolatum* var. *maingayi: Maingay 625*, holotype in K, isotypes seen from CAL, L.

Pygeum hookerianum: lectotype: *Wray 3969*, holotype in CAL, isotypes seen from BM, K, SING; syntypes: *King's Coll. 1970* (CAL, US), *2083* (CAL, E), *2753* (CAL), *4789* (BO, CAL), *6425* (A, CAL, P), *Scortechini 1234* (BM, CAL, K).

Pygeum hookerianum var. *borneense: Hose 186*, holotype in K, isotype seen from BM.

Pygeum latifolium var. *tomentosum:* not cited. From the text can be inferred that the authors saw at least: *Koorders 6407β* (BO), *6409β* (BO, L), *13544β* (BO), *22486β* (BO), *36937β* (BO), the latter three from the same tree, *20077β* (BO, L), *20250β* (BO, L), *22255β* (BO, CAL, L), the latter three also from one tree. Lectotype chosen by me: *Koorders 22255β*, holotype in BO. Forma *lanceolatum* was not typified.

Pygeum microphyllum: Elmer 13198, holotype in PNH (lost), isotypes seen from BM, BO, E, L.

Pygeum koordersianum: Koorders 22255β, holotype in BO, isotypes seen from CAL, L. From same tree collected: *Koorders 20077β* (BO, L) and *20250β* (BO, L).

Pygeum membranaceum: lectotype: *Junghuhn Pl. Ined. 311*, holotype in L; syntype: *Junghuhn 310 (249)* and *187*, both in L.

Pygeum velutinosum: lectotype: *Burkill & Haniff SFN 16947*, holotype in K, isotypes seen from BO, KEP, SING; syntype: *Burkill & Haniff SFN 17092* (BM, K) (not *17902* as cited by Ridley).

Pygeum kingianum: Kerr 17167, holotype in K, isotype seen from SING.

Pygeum havilandii: Haviland 2063, holotype in K, isotypes seen from A, L, SAR, SING.

Pygeum apiculatum: lectotype: *Poilane 7152*, holotype in P, no isotypes seen. The other specimen cited *(Poilane 7530)* is *Prunus ceylanica.*

Pygeum longistylum: Poilane 18062, holotype in P, no isotypes seen.

Tree, rarely larger than 12 m, or shrub up to 4½ m, but in Java always recorded as a tree of 12—25 m. *Leaves* ovate or elliptic to oblong, 4—14 by 1½—6 cm, index 2—3, apex (long-)acuminate, papyraceous; basal glands usually 2(0—4), often not at entire base, but higher up. *Racemes* up to 1 cm long, very rarely up to 2½ cm. *Pedicels* 0—2 mm. *Hypanthium* 1½—2(—3) mm. *Perianth segments* 7—10, usually subequal, sometimes more or less regularly differentiated as sepals and petals, up to 1¼ mm long. *Ovary* usually glabrous, sometimes sparsely hairy, rarely more densely so. *Fruits* subglobular to transversely ellipsoid, shortly pointed or not, rarely distinctly beaked (beak 1—2 mm long, but in Borneo sometimes 3—4 mm), 7—12 by 8—12½ mm.

Distribution. Burma (Tenasserim), Thailand (Peninsula, Krat), S. Vietnam (Annam), Sumatra (northern half), throughout Malaya, *incl.* Penang I., Singapore, Java (not in the western part), Borneo (Sabah, Sarawak), Palawan. — Fig. 19.

Ecology. Primary and secondary forest, 0—1300(—1650) m.

Compilation of field-notes. Bark (few data) brown to grey, smooth. Wood reddish or brown. Flowers white to cream-coloured. Fruits green when young, becoming white, red, violet, finally black. *Uses:* rarely mentioned as timber.

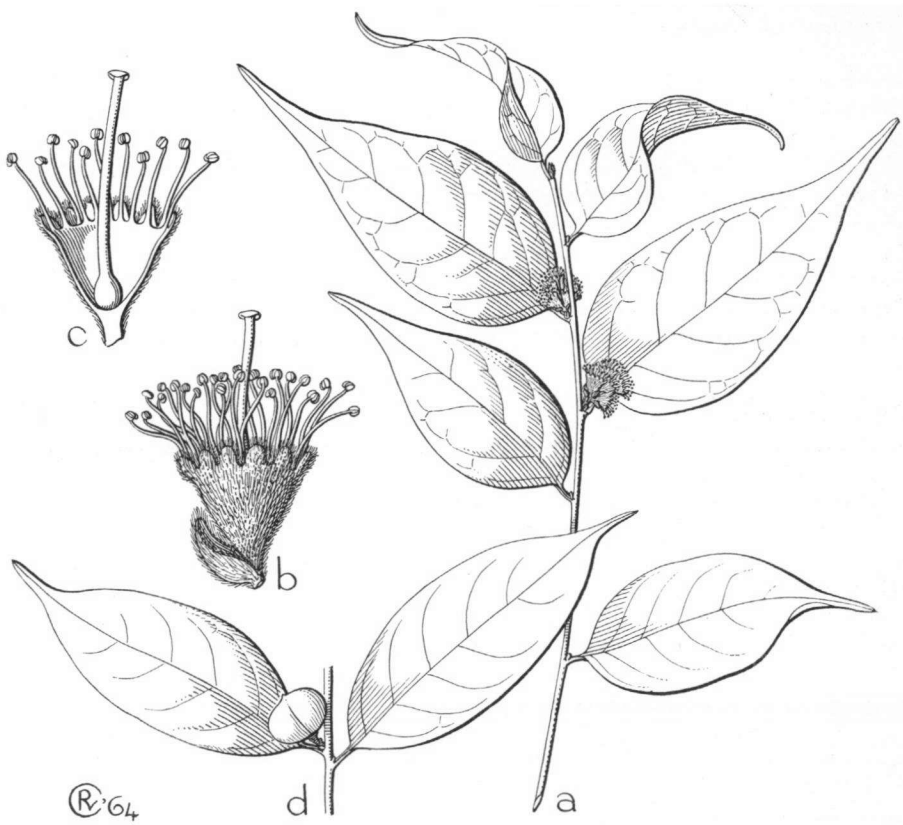

Fig. 22. *Prunus grisea* var. *tomentosa*. — a. flowering twig (× 2/3); b. flower, and c. halved flower (× 4); d. infructescence (× 2/3). (a. from *Meijer 3548*; b, c. from *Junghuhn 187*; d. from *Sinclair 10677*).

Remarks. The main constituents of this variety are the Malayan entity, formerly usually identified as *Pygeum maingayi (incl. P. lanceolatum* with elliptic leaves, and *hookerianum* with ovate leaves) and the Javanese *P. latifolium* var. *tomentosum*. The two are only slightly different: the trees are bigger in Java, and the leaves slightly more pubescent beneath. From outside the two regions mentioned the variety is not so well-known, but I do not doubt that the forms described as *P. kingianum* from Thailand, *havilandii* from Borneo, *microphyllum* from Palawan, and *longistylum* from Vietnam, must be included in it.

Some variations may further be mentioned.

The long racemes (of more than 1 cm) are only known from the continent and from Borneo.

One of the 2 fruiting specimens, known from Borneo, differs in having a relatively large beak on the fruit (3—4 mm long). The leaves of that specimen *(Richards 1435)* fully agree with those of *Hose 186*, the (flower-bearing) type of *Pygeum hookerianum* var. *borneense*. It seems too early, however, to establish a separate infraspecific taxon for those specimens, especially since the shape of the fruit (pointed, beaked or not) is rather variable in var. *tomentosa*.

Despite the above indicated variability, the variety is generally not difficult to recognize characterized as it is by its thin papery leaves and its very short and dense racemes.

c. var. microphylla Kalkm., *var. nov.* — ?*Pygeum albivenium* Koehne, Bot. Jahrb. 51 (1913) 209.

Typification. Var. *microphylla: Sleumer & Vink 14250* from Arfak Mts, holotype in L. *Pygeum albivenium: Forbes 655*, holotype in L, isotype seen from K.

Ad typo differt in folia minore, maxime 7 cm longa.

Usually a shrub or small tree, sometimes (especially in Terr. New Guinea?) a tree of up to 28 m. *Leaves* elliptic to elliptic-oblong, 2—7 by 1—3½ cm, index 1½—2½, apex obtuse, often retuse, margins usually revolute, (rather) stiff-coriaceous; basal glands 2, or 4 and then 2 of them often rather high up in the blade, rarely 0. *Racemes* 2—5 cm. *Pedicel* 1—4 mm. *Hypanthium* 1½—3(—3½) mm high. *Perianth segments* 8—12, usually subequal, sometimes regularly divided into sepals and petals, ½—1½ mm long. *Ovary* glabrous. *Fruits* subglobular to transversely ellipsoid, 6—9 by 7—10½ mm; fruiting calyx sometimes large, 1½—5 mm across.

Distribution. Throughout New Guinea. — Fig. 19.

Ecology. Montane and subalpine forest, rarely also in more open vegetation, 1400—3500 m.

Compilation of field-notes. Hardly any data for bark and wood. Leaves leathery, dark green above, lighter beneath. Flowers scented, white to creamy (i.e. perianth yellowish white, filaments and style white, anthers brown). Fruits green, turning red, purplish and black. *Vernaculars: Kubabigl* or *Kubambelth* (Hagen language) twice reported, cf. also *P. pullei* var. *grandiflora* and *P. sclerophylla. Uses:* Bark once noted to be used for belts (as are *P. oligantha* and *P. sclerophylla).*

Remarks. The only difference between this variety and var. *grisea* lies in the dimensions of the leaves, as indicated in the key. There is no correlation whatever with the altitude, and var. *microphylla*, consequently, cannot be considered as a mere high-altitude form.

Since *Pygeum albivenium* is only a doubtful synonym (the type specimen is slightly deviating *i.a.* by its sparsely hairy ovary), I prefer not to make use of that epithet.

18. Prunus brachystachya Kalkm., *spec. nov.*

Type: *Henty NGF 10526*, holotype in L, isotype seen from BO.

Rami primo puberuli mox glabrati. Folia oblonga vel ovata, 7—17×3—8½ cm, acuminata, adulta glabra, nervis utrinque 7—11, glandibus basalibus 2, planis; petiolus ad 1 cm longus. Racemi solitarii, (½—)1½—3 cm longi, pubescentes. Pedicelli 0—1 mm. Hypanthium 2—2½ mm altum. Perianthium regulariter 4-merum; sepala c. ¾ mm longa; petala c. 1 mm longa. Stamina 15—25. Pistillum glabrum. Drupa transverse ellipsoidea vel didyma, 9—11 × 10—16 mm; testa glabra.

Small tree, up to 10 m. *Twigs* sparsely puberulous, rapidly glabrescent. *Leaves* oblong to ovate, 7—17 by 3—8½ cm, index 2—3, base rounded and slightly decurrent, or more acute, apex acuminate, glabrous when mature (probably sparsely pubescent beneath when young), thin; nerves 7—11 pairs, flat or slightly impressed above, rather prominent beneath, venation not conspicuous; basal glands 2, flat, additional glands usually present, flat; petiole up to 1 cm, slender, sparsely puberulous when young, glabrescent. *Stipules* 4½—5½ by 1—1½ mm, index 3—5, sparsely pubescent to glabrous outside, glabrous inside. *Racemes* solitary, in axils of extant or fallen leaves, (½—)1½—3 cm; peduncle very short; rachis pubescent, sometimes only sparsely so. *Bracts* 2—3 mm long, sparsely pubescent outside, glabrous inside, ciliolate. *Pedicels* 0—1 mm, sparsely pubescent.

Hypanthium 2—2½ mm high, (sparsely) hairy outside, inside only hairs on bottom or also some few higher up. *Perianth* differentiated as sepals and petals, 4-merous; sepals broadly triangular, *c.* ¾ mm long; petals elliptic, *c.* 1 mm long, pubescent outside as are the sepals. *Stamens* 15—25; filaments up to 3½ mm, glabrous; anthers 0.3—0.5 mm long. *Ovary* glabrous. *Fruits* transversely ellipsoid to didymous, 9—11 by 10—16 mm, 1.1—1.5 times as wide as long, glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. East New Guinea (Terr. New Guinea: Madang and Morobe Distr.; Terr. Papua: Northern and Central Distr.), D'Entrecasteaux Is (Normanby I.). — Fig. 23.

Ecology. Forest, several times reported from riverbanks, low altitude (up to 450 m).

Compilation of field-notes. Few data. Bark grey, strongly smelling. Wood yellowish brown. Flowers white. Fruits green turning white, red, and finally black.

Remarks. A species in the group of *P. grisea* and *P. dolichobotrys*. For differences see key.

19. Prunus kinabaluensis Kalkm., *spec. nov.*

Type: *Clemens 29527*, holotype in L, isotypes seen from A, BO, K, NY.

Rami glabri. Folia elliptica vel elliptico-oblonga, 7—10 × 3—5 cm, glabra, nervis utrinque 5—7, glandibus basalibus 3—6, supra basin insertis, planis; petiolus ½—1½ cm. Racemi solitarii, axillares, 2—5½ cm, sparse pubescentes. Pedicelli ad 6 mm longi. Hypanthium 2½—3 mm altum. Perianthii lobi 10—12, subaequales, c. 1 mm longi. Stamina 28—32. Pistillum glabrum. Drupa (non satis nota) subglobosa, 14 × 15 mm; testa glabra.

Small tree, less than 10 m. *Twigs* glabrous. *Leaves* elliptic to elliptic-oblong, 7—10 by 3—5 cm, index 2—2½, base acute to rounded, apex (shortly) acuminate to obtuse, rather stiff when dry, glabrous when mature (probably puberulous beneath when young); nerves 5—7 pairs, slightly impressed above, prominent to hardly prominent beneath, venation almost invisible; basal glands 3—6, up to rather high in the blade, not in the corner, flat, additional glands few or none; petiole ½—1½ cm, glabrous. *Stipules* 3½—5½ by ¾—2 mm, index 2½—7, sparsely pubescent outside when young, ciliolate, marginal glands sometimes present. *Racemes* solitary, axillary, 2—5½ cm; peduncle ½—1 cm; rachis sparsely pubescent. *Bracts* (one seen) *c.* 3 mm long, almost glabrous, ciliolate. *Pedicels* up to 6 mm, sparsely pubescent. *Hypanthium* 2½—3 mm high, pubescent to almost glabrous outside, glabrous inside (sometimes with hairs on the bottom?). *Perianth segments* 10—12, subequal, *c.* 1 mm long. *Stamens* 28—32; filaments up to 4 mm, glabrous; anthers 0.4 mm long. *Ovary* glabrous. *Fruits* (few seen) subglobular, up to 14 by 15 mm, glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. Borneo (Mt Kinabalu). — Fig. 23.

Ecology. 1600—2100 m alt.

Remarks. Only known from 3 specimens, one fruiting (type), one with flowers *(Clemens 40995)*, one with very young buds *(Carr SFN 27674A)*. Conspicuous are the large basal glands which are not placed in the entire corner. This position is also found in New Guinea specimens of *P. grisea*. The connection with the latter species is obvious, but differences are such that, on the evidence available, I rather want to consider this a separate species.

Pygeum odoratum Henders., placed under the incompletely known species, seems to be near the present species.

20. Prunus glabrifolia Kalkm., *nom. nov.* — *Pygeum brevifolium* Hook. *f.*, Fl. Brit. Ind. 2 (1878) 321; King, J. As. Soc. Beng. 66, 2 (1897) 293; Koehne, Bot. Jahrb. 51

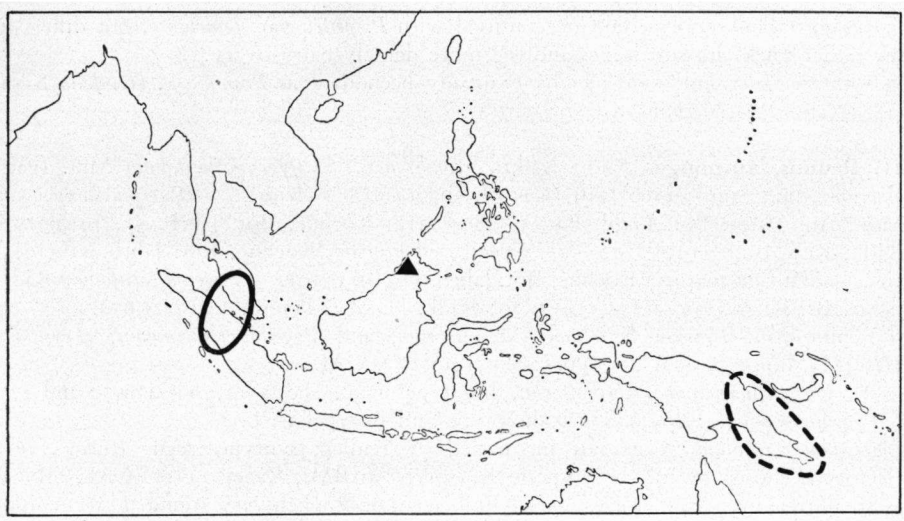

Fig. 23. Distribution of 18. *P. brachystachya* (— — — —), 19. *P. kinabaluensis* (▲), 20. *P. glabrifolia* (————).

(1913) 187; Ridl., Fl. Mal. Penins. 1 (1922) 676. — *Pygeum scortechinii* King, J. As. Soc. Beng. 66, 2 (1897) 290; Koehne, Bot. Jahrb. 51 (1913) 188; Ridl., Fl. Mal. Penins. 1 (1922) 674.

Typification. *Pygeum brevifolium, Prunus glabrifolia:* lectotype: *Griffith 2051*, holotype in K, isotypes seen from A, CAL; syntype: *Lobb (s.n.?)* from Mt Ophir *(non vidi)*.

Pygeum scortechinii: Scortechini 357, holotype in K, isotypes seen from BM, CAL.

Shrub or small tree. *Twigs* pubescent when very young, soon glabrescent. *Leaves* elliptic to oblong, 3½—7½(—11) by 1½—4(—5) cm, index *c.* 2, base acute, rarely rounded, apex obtuse to acuminate, usually entirely glabrous when mature, pubescent beneath and on midrib above when very young only, stiff and hard when dry; nerves 4—6(—7) pairs, slightly impressed to flat above, rather prominent beneath, venation inconspicuous; basal glands 2, flat, additional glands few, small, flat; petiole up to ¾ cm, pubescent when very young, early glabrescent. *Stipules* 2—4 by ¾—1½ mm, index 2—5, pubescent outside and there often with 1—3 pustular to flat glands, glabrous inside, marginal glands usually present. *Racemes* solitary, in axils of leaves or (more rarely) of their scars, ½—3½ cm during anthesis; peduncle almost 0; rachis pubescent. *Bracts c.* 1 mm long, hairy outside, glabrous inside, lower ones sometimes tripartite. *Pedicel* 0—1 mm, rarely slightly longer, pubescent. *Hypanthium c.* 1½ mm high, pubescent outside, inside glabrous or with some few hairs on bottom. *Perianth segments* 6—9, subequal, small, less than ¾ mm long, hairy. *Stamens* 12—20; filaments up to 1½ mm, glabrous; anthers 0.3—0.5 mm long. *Ovary* densely hairy at base, higher up more scattered hairy; style up to 2 mm, scattered hairy. *Fruits* (few seen) transversely ellipsoid, 6—9 by 9—11 mm, *c.* 1.2 times as wide as long, sparsely hairy; endocarp glabrous; seedcoat glabrous.

Distribution. Sumatra (W. Sum.: Pajakumbuh), Malaya (Perak, Malacca: Mt Ophir, Mt Ledang). — Fig. 23.

Ecology. Hardly any data. The Pajakumbuh specimens *(Meijer 7553, 7559)* were collected on limestone hills, at 800 m, the Malaya specimens possibly come from *c.* 1200 m.

Remarks. This species could be confused with *P. grisea* var. *tomentosa*, but differs in the rather thick and stiff leaves and the more densely hairy ovary.

Both *brevifolia* and *scortechinii* have already been used in *Prunus: P. brevifolia* Savat (1883) and *P. scortechinii* Koehne (1915).

21. Prunus lamponga (Miq.) Kalkm., *comb. nov.* — *Pygeum latifolium* Miq. (var.) *glabrum* Miq., Sum. (1860) 116 *(nomen)*, 307 *(descr., 'glabrius')*. — *Pygeum lampongum* Miq., Ann. Mus. Bot. Lugd.-Bat. 1 (1864) 212; Koehne, Bot. Jahrb. 51 (1913) 192; Ridl., Kew Bull. (1938) 282. — *Pygeum goethartianum* Koehne, Bot. Jahrb. 51 (1913) 191. — ?*Pygeum gracilipes* Koehne, Bot. Jahrb. 51 (1913) 191. — *Pygeum coriifolium* Ridl., J. Str. Br. R. As. Soc. n. 75 (1917) 30; Ridl., Fl. Mal. Penins. 1 (1922) 675.

Typification. *Pygeum latifolium* var. *glabrum*, and *Pygeum lampongum: Teysmann HB 4434*, holotype in U, isotypes seen from BO, CAL.

Pygeum goethartianum: Korthals s.n., holotype in L, sheets nr. 898.270-72 and -73.

Pygeum gracilipes: Korthals 126, holotype and isotypes in L.

Pygeum coriifolium: type not mentioned by Ridley, syntypes seen: *Ridley 14614* (lectotype chosen by me, holotype in K, isotype in BM), *Ridley 14616* (CAL, SING).

Small tree, up to 8 m. *Twigs* sparsely pubescent only when very young. *Leaves* elliptic to oblong, rarely more ovate, 7—14(—21) by 3—6(—9) cm, index 1½—2½, base acute or more rarely rounded, apex (usually shortly) acuminate, margin often revolute, herbaceous, both surfaces of mature leaves glabrous, pubescence only present when very young, rarely the lower surface of mature leaves sparsely but distinctly pubescent; nerves 4—9(—11) pairs, wide apart, slightly impressed to flat above, prominulous beneath, looped and joined towards the margin, venation almost invisible; basal glands (fig. 7 g) usually 2, flat, rarely 3 or 4, additional glands usually present; petiole up to 1 cm, glabrous, pubescent only when very young. *Stipules* 3—7 by ½—1 mm, index 4—8, hairy to glabrous outside, glabrous or almost so inside, sometimes with marginal glands. *Racemes* solitary, in the axils of leaves or their scars, up to 2½ cm during anthesis, up to 3½ cm when in fruit; peduncle 0—5 mm; rachis shortly pubescent. *Bracts* up to 2 mm long, hairy outside, glabrous inside, the lowermost ones sometimes tripartite. *Pedicels* up to 2 mm, or flowers subsessile. *Hypanthium* 1¾—2½ mm high, sparsely pubescent outside, inside only with hairs at the base. *Perianth segments* 7—12(—15), subequal, or unequal but not regularly differentiated as sepals and petals, up to 1 mm long, (sparsely) hairy outside. *Stamens* 17—32(—40); filaments up to 3 mm, glabrous; anthers ¼—½ mm long. *Ovary* from sparsely pubescent to densely hairy, often the ventral suture less hairy or glabrous; style up to 4 mm, glabrous. *Fruits* subglobose to ellipsoid, with a usually pronounced apical beak of 1—4 mm long, without the beak 14—22 by 14—18 mm, sparsely hairy to glabrous, rarely densely hairy; endocarp glabrous; seedcoat glabrous.

Distribution. Sumatra (Central and S. Sumatra), Banka, Malaya (Perak, Pahang, Johore), Borneo (Sabah, Sarawak, Indon. Borneo). — Fig. 24.

Ecology. Lowland forest, 0—750 m.

Compilation of field-notes. Bark grey, (rather) smooth, reticulately marked, 1—2 mm thick, inner bark redbrown. Wood light ochre-yellow (only once noted). Flowers greenish, with white stamens.

Remarks. This species is rather uniform and usually easily recognized by its glabrous and inconspicuous-veined leaves and beaked fruits. The specimens *Amdjah 733* (Indon. Borneo, Mt Djempanga) and *Wood 1943* (Sabah), however, differ in having a distinct pubescence on the lower surface of the large leaves, and in having densely

pubescent fruits. Since the material is very scanty, I refrained from basing a variety on it, although this is probably the status this form deserves. A sterile specimen, *NIFS bb 13234* from Laut I. near SE. Borneo, probably belongs to the same 'variety'; it is the only specimen of the three that bears some annotations, it is remarkable that this tree is recorded to be 26 m high. Only 4 collections of typical *lamponga* bear data on this point, all are trees of only 7 or 8 m.

Pygeum griffithii Hook. *f.* might be another synonym of the present species, see p. 106.

22. Prunus sclerophylla Kalkm., *spec. nov.*

Type: *Robbins 573*, holotype in L, no isotypes seen but certainly distributed.

Rami dense pubescentes. Folia elliptica vel oblonga, raro ovata, (1½—)2—7 × (¾—) 1—3 cm, primo pubescentia, subglabrata, nervis utrinque (4—)5—7, glandibus basalibus 0 vel 2, planis; petiolus ¼—½ cm. Racemi solitarii, axillares, in anthesi ad 1½ cm longi, rachi pubescente. Pedicelli c. 2 mm longi. Hypanthium c. 2½ mm altum. Perianthii lobi 10—12, subaequales, c. 1 mm longi. Stamina 18—22. Pistillum glabrum. Drupa transverse ellipsoidea, 6½—7 × 8—9½ mm; testa glabra.

Small tree or shrub. *Twigs* densely pubescent. *Leaves* elliptic to oblong, rarely more ovatish, (1½—)2—7 by (¾—)1—3 cm, index 1½—2½, base acute, apex usually acute or shortly and bluntly acuminate, hard and stiff when dry, pubescent when young, glabrescent but still hairy beneath when mature; nerves (4—)5—7 pairs, impressed above, rather prominent beneath, venation not conspicuous; basal glands 0 or 2, flat, additional glands 0; petiole ¼—½ cm, pubescent. *Stipules* 3—4 by ¾—1 mm, index 3—5, densely pubescent outside, glabrous inside. *Racemes* solitary, in axils of leaves or their scars, up to *c.* 1½ cm during anthesis; peduncle up to ½ cm; rachis pubescent. *Bracts c.* 1½ mm long, densely pubescent outside, glabrous inside. *Pedicels c.* 2 mm, densely pubescent. *Hypanthium c.* 2½ mm high, densely pubescent outside, inside only with hairs on bottom. *Perianth segments* 10—12, subequal, *c.* 1 mm long, hairy. *Stamens* 18—22; filaments up to 3 mm, glabrous; anthers *c.* ½ mm long. *Ovary* glabrous; style up to 2 mm, glabrous. *Fruits* transversely ellipsoid, 6½—7 by 8—9½ mm, glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. East New Guinea. Known from 5 specimens, all from Terr. New Guinea: Kubor Range and Mt Oga in West. Highl. Distr., Mt Michael and Mt Elandora in East. Highl. Distr. — Fig. 24.

Ecology. Montane forest and subalpine scrub, 2100—3100 m.

Compilation of field-notes. Flowers cream. Fruits black when ripe, younger ones red. *Vernaculars: Kubanbigl* (Hagen lang.) once reported, cf. also *P. grisea* var. *microphylla* and *P. pullei* var. *grandiflora. Uses:* bark of larger trees used for native broadbelts (Hagen), as is also reported for *P. oligantha* and *P. grisea* var. *microphylla.*

Remarks. Related to *P. grisea*, but *i.a.* differing in having distinctly pubescent leaves, also when mature. To be distinguished from *P. pullei* var. *pullei*, which it sometimes resembles, by its glabrous ovary.

23. Prunus pulgarensis (Elm.) Kalkm., *comb. nov.* — *Pygeum pulgarense* Elm., Leafl. Philip. Bot. 5 (1913) 1627; Koehne, Bot Jahrb. 52 (1915) 336; Merr., Enum. Philip. 2 (1923) 234. — *Pygeum monticolum* Merr., Philip. J. Sc. 10 (1915) Bot. 312; Merr., Enum. Philip. 2 (1923) 233.

Typification. *Pygeum pulgarense: Elmer 13200*, holotype in PNH (lost), lectotype in L, isotypes seen from BO, E.

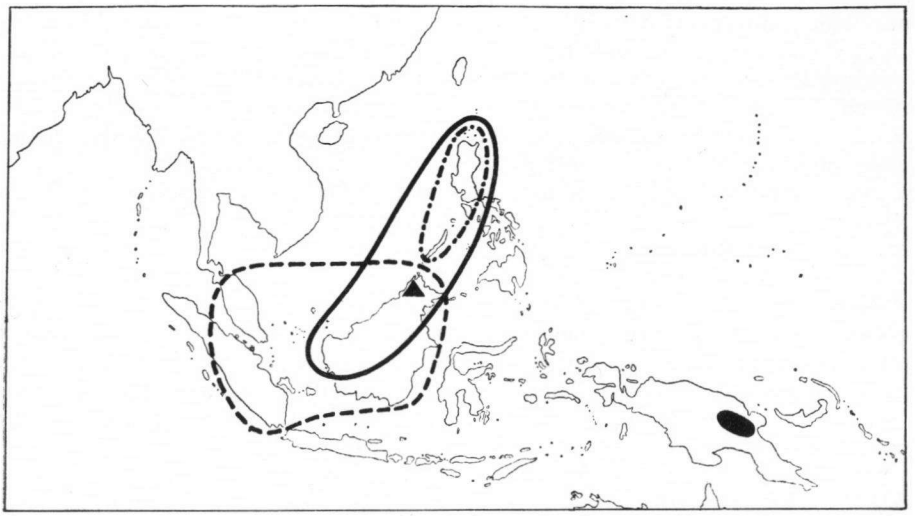

Fig. 24. Distribution of 21. *P. lamponga* (— — — —), 22. *P. sclerophylla* (in solid black), 23. *P. pulgarensis* (—.—.—), 24. *P. spicata* (————), 25. *P. laxinervis* (▲).

Pygeum monticolum: Whitford 1203, holotype in PNH (lost), lectotype in US, isotype seen from K.

Small tree. *Twigs* densely woolly pubescent, glabrescent. *Leaves* elliptic to oblong or ovatish, 7—14 by 3—5½ cm, index 1½—3, base acute or rounded, apex short- or long-acuminate, rather hard and stiff when dry, densely pubescent when young, glabrescent but the lower surface remaining hairy, especially on the nerves; nerves 6—9 pairs, impressed above, prominent below, venation reticulate, impressed above, inconspicuous beneath; basal glands 2—4, flat, or absent, additional glands usually absent; petiole ½—1½ cm, pubescent, glabrescent. *Stipules* (very few seen) *c.* 3—4½ by 1—2 mm, index 2—4, hairy on both sides, marginal glands sometimes present. *Racemes* solitary, in axils of leaves or their scars, up to 5½ cm; peduncle 0; rachis densely pubescent. *Bracts* (one seen) 2 mm long. *Pedicels* up to 1 mm, densely pubescent. *Hypanthium* 2—2½ mm high, densely pubescent outside, on inner surface with hairs at rim and on bottom only. *Perianth segments* 8—10, subequal, up to 2 mm long, densely hairy. *Stamens* 25—35; filaments up to 5 mm, glabrous or slightly hairy at base; anthers 0.5—0.6 mm long. *Ovary* densely hairy. *Fruits* (few seen) globular, 14—18 mm diam., rather densely hairy when ripe; mesocarp thick (*c.* 1 mm) and hard when dry, apparently thick-fleshy when living; endocarp *c.* ⅓ mm thick, glabrous; seedcoat glabrous.

Distribution. Philippines (3 specimens seen from Luzon, 1 from Palawan). — Fig. 24.

Ecology. Elmer 13200 was found in the 'chaparral vegetation' on the summit of Mt Pulgar, at 1200 m., *Whitford 1203* is from 'forested slopes' of Mt Mariveles, at 1060 m. The two other specimens bear no data on altitude or vegetation.

Remarks. This is a little known species. The type of *pulgarensis* is in flower (only one flower could be examined!), that of *P. monticolum* is in fruit, the evidence for putting them together is, consequently, drawn from the similarity of the vegetative parts.

The thick mesocarp distinguishes the species from *P. spicata*, to which species it seems most closely allied.

24. Prunus spicata Kalkm., *spec. nov.*

Type: *Clemens 40755*, holotype in L, isotypes seen from A, K.

Rami dense lanati. Folia oblonga vel lanceolata, raro ovata, 6—18 × 2½—6½ cm, apicem versus (longe) acuminata, densiuscule ad dense pubescentia, subglabrata, nervis utrinque 6—12, glandibus basalibus 2, raro 4, planis vel raro subexcavatis; petiolus ¼—1 cm longus. Racemi solitarii, axillares, 2½—10 cm, rachi dense pubescente. Flores sessiles vel breviter (ad 1 mm) pedicellati. Hypanthium 2—3 mm altum. Perianthii lobi 8—10, subaequales, sed interdum perianthium dichlamydeum, ad 1¼ mm longi. Stamina 15—25(—30?). Ovarium (et saepe etiam styli basis) dense pubescens. Drupa subglobosa, 10—12½ × 11—13 mm; testa glabra.

Small tree, up to 12(—25) m. *Twigs* densely woolly pubescent, glabrescent. *Leaves* oblong or lanceolate, rarely ovate, 6—18 by 2½—6½ cm, index (2—)2½—4(—4½), base rounded, apex acute, long tapering or acuminate, herbaceous, thin when dry, (rather) densely pubescent when young, only on lower surface remaining sparsely pubescent when mature; nerves 6—12 pairs, flat to slightly impressed above, prominent below, venation not very conspicuous or almost invisible; basal glands 2, rarely 4, flat or (rarely) slightly hollowed, additional glands few, small; petiole ¼—1 cm, densely woolly pubescent, glabrescent. *Stipules* 3—6 by ½—1½ mm, index 4—7(—12), pubescent outside, less densely so or almost glabrous inside, marginal glands usually present. *Racemes* solitary, axillary, 2½—10 cm; peduncle usually less than ½ cm; rachis densely pubescent. *Bracts* (fig. 5 e, f) 1½—2 mm long, pubescent outside, basal ones sometimes with tridentate apex. *Pedicels* 0—1 mm, pubescent. *Hypanthium* 2—3 mm high, densely woolly pubescent outside, on inside only with hairs on bottom, more rarely glabrous. *Perianth segments* 8—10, usually subequal or not very different, but sometimes more or less distinctly differentiated as sepals and petals, the former attached with broader base, up to 1¼ mm long, densely hairy outside. *Stamens* 15—25(—30?); filaments up to 4½ mm, glabrous or sparsely hairy at base; anthers 0.3—0.5 mm long. *Ovary* densely hairy; style up to 4½ mm, often also partly hairy. *Fruits* subglobular, 10—12½ by 11—13 mm, hairy to almost glabrous; whole pericarp not more than ½ mm thick *in sicco*, endocarp glabrous; seedcoat glabrous.

Distribution. Borneo (Sabah, Sarawak, Indon. Borneo), Philippines (Luzon. A doubtful, sterile specimen seen from Mindoro). — Fig. 24.

Ecology. Primary and secondary forest, 1200—1500 m (all records from Borneo, none from Luzon).

Compilation of field-notes. Bark dark-coloured, smooth, inner bark fibrous, pinkish or yellowish. Sapwood (once noted) lightyellow, heartwood pinkish brown. Flowers cream-coloured to brown (due to the hairs?), anthers pink.

Remarks. The 14 specimens seen from Borneo are rather uniform, as are the 4 from Luzon. The two populations, however, show some slight differences: the leaves of Philippine specimens are more densely pubescent and the fruits are larger and less densely pubescent than those of Bornean specimens. Since I expect that future collections will bridge the already hardly existing gap, I have decided to consider the two populations conspecific.

Relationships are with *P. laxinervis* from Mt Kinabalu, and certainly also with *P. pulgarensis* from the Philippines, the latter differing *i.a.* by having a distinctly thicker pericarp.

25. Prunus laxinervis Kalkm., *spec. nov.*

Type: *Clemens 28477*, holotype in L, isotypes seen from A, BO, K, NY.

Rami primo sparse pubescentes mox glabrati. Folia elliptica vel oblonga, 10—17 × 5—8 cm, sparse pubescentia vel subglabra, nervis utrinque 7—9, remote arcuatis, glandibus basalibus 2, planis; petiolus ad 1(—1½) cm longus. Racemi solitarii, axillares, ad 5 cm longi, rachi dense pubescente. Pedicelli 1—3 mm. Hypanthium 1½—3 mm altum. Perianthium dichlamydeum, 4-merum; sepala triangularia, ad 1½ mm longa; petala ovata, basin versus angustata, ad 1½ mm longa. Stamina 25—40. Ovarium et styli basis dense pubescentes. Drupa subglobosa vel transverse ellipsoidea, 10½—13 × 12—13 mm; testa glabra.

Tree up to 18 m, or large shrub. *Twigs* sparsely pubescent, rapidly glabrescent. *Leaves* elliptic to oblong, 10—17 by 5—8 cm, index 1¾—2½, base acute to rounded, apex acuminate, herbaceous, glabrous or almost so above, sparsely pubescent to almost glabrous beneath; nerves 7—9 pairs, rather wide apart, looped and joined at *c.* ½ cm from the margin, flat to impressed above, prominent beneath, venation almost invisible above, inconspicuous beneath; basal glands 2, flat, additional glands usually present; petiole up to 1(—1½) cm, pubescent, glabrescent. *Stipules* 4½—5½ by 1½—2 mm, index 2—3, pubescent outside, (almost) glabrous inside, marginal glands present. *Racemes* solitary, axillary, up to 5 cm; peduncle up to ½ cm; rachis densely pubescent. *Bracts* large, *c.* 4 mm long, caducous, lowermost ones empty, tripartite. *Pedicels* 1—3 mm, pubescent. *Hypanthium* 1½—3 mm high, often rather wide, pubescent outside, glabrous inside or with some short hairs on bottom. *Perianth* biseriate, 4-merous, the two whorls not very different, but distinguishable by their shape; sepals triangular, up to 1½ mm long, hairy outside; petals ovate, with narrow base, sometimes thinner than sepals, up to 1½ mm long, hairy. *Stamens* 25—40; filaments up to 3 mm, glabrous; anthers *c.* ½ mm long. *Ovary* densely hairy; style up to 4 mm, glabrous except base. *Fruits* subglobular to transversely ellipsoid, 1—1.2 times as wide as long, 10½—13 by 12—13 mm, sparsely hairy; endocarp glabrous; seedcoat glabrous.

Distribution. Borneo: several specimens, all from Mt Kinabalu. — Fig. 24.

Ecology. 'Jungle' (Clemens), 1000—1800 m.

Compilation of field-notes. Flowers cream-coloured, anthers brown.

Remarks. The glabrous leaves with their arcuating nerves which stand rather wide apart, the short racemes, and the rather large (always 4-merous?) flowers are the distinguishing features of this species which seems to be most closely related to *P. spicata.*

26. Prunus clementis (Merr.) Kalkm., *comb. nov.* — *Pygeum clementis* Merr., Philip. J. Sc. 3 (1908) Bot. 227; Elm., Leafl. Philip. Bot. 5 (1913) 1621; Koehne, Bot. Jahrb. 51 (1913) 205; Merr., Enum. Philip. 2 (1923) 232. — *Pygeum zeylanicum* (*non* Gaertn.) Koord., Minah. (1898) 449; Koord., Suppl. Cel. 2 (1922) 7, pl. 12. — *Pygeum apoense* Elm., Leafl. Philip. Bot. 5 (May 1913) 1623; Koehne, Bot. Jahrb. 52 (1915) 337; Merr., Enum. Philip. 2 (1923) 232. — *Pygeum apoanum* Elm. *(in herb.) ex* Koehne, Bot. Jahrb. 51 (Dec. 1913) 205, *nom. superfl.*

Typification. *Pygeum clementis:* lectotype: *Clemens 760*, holotype in BO, isotypes not seen; syntype: *Clemens 966 (non vidi).*

Pygeum apoense, Pygeum apoanum: Elmer 11729, holotype in PNH (lost), lectotype in A, other isotypes seen from BM, BO, CAL, E, K, L, P, US.

Tree up to 30 m. *Twigs* pubescent, glabrescent. *Leaves* oblong, 10—22 by 3½—9 cm, index 2—4, base rounded, apex gradually tapering to acuminate, rarely obtuse, both surfaces probably pubescent in young leaves, sparsely pubescent to almost glabrous when mature, herbaceous; nerves 9—15 pairs, flat to slightly impressed above, prominent beneath, venation usually not conspicuous; basal glands 2, 3, or 4, distinctly hollowed

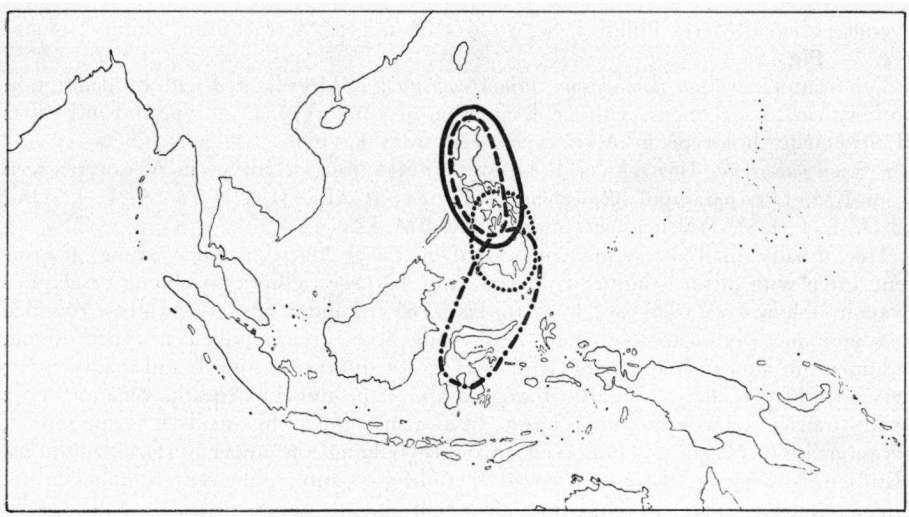

Fig. 25. Distribution of 26. *P. clementis* (—.—.—), 27. *P. marsupialis* (————), 28. *P. rubiginosa* (. . . . .), 29. *P. fragrans* (— — — —).

to flat, in some leaves absent, additional glands often many, also protruding above or flat; petiole ½—¾ cm, pubescent, glabrescent. *Stipules* 5—7½ by 2—4½ mm, index 2—3½, midrib keeled inside and the 2 stipules intrapetiolarly connate with their keels over 1—4 mm, both surfaces pubescent or the inside more or less glabrous, marginal glands usually present though inconspicuous. *Racemes* solitary, axillary, sometimes in axils of already fallen leaves, 3—7 cm; peduncle usually less than ½ cm; rachis pubescent. *Bracts* 2—3 mm long, pubescent outside, pubescent to glabrous inside, lowermost ones tripartite. *Pedicels* 1—4 mm, up to 6 mm under the fruit, pubescent. *Hypanthium* 2—3 mm high, pubescent outside, on inside only hairs on bottom and rim, rarely all over. *Perianth segments* 7—10, equal or subequal *c.* 1 mm long, pubescent. *Stamens* 20—40; filaments up to 4½ mm, hairy at base; anthers 0.3—0.4 mm long. *Ovary* densely hairy, rarely more sparsely so; style up to 4½ mm. *Fruits* compressed-subglobular to transversely ellipsoid, 13—14 by 14—17(—20) mm, 1—1½ times as wide as long, more or less pubescent to glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. Mindanao, Celebes. — Fig. 25.

Ecology. Primary and secondary forest, up to 1050 m.

Compilation of field-notes. Bark with some colourless sap, smelling like almonds. Flowers yellowish, with a sweet scent. Fruits green when young, dark red when older. *Frake PNH 36173* mentions: 'used as medicine for headache and skin eruptions', this probably refers to a decoction of the bark.

Remarks. A species, characterized by the oblong leaves and the connate stipules. The basal glands are very variable: deeply hollowed in three out of four specimens from Mindanao (but flat in *Elmer 11729)*, flat in six out of seven Celebes specimens (but slightly hollowed ones in *NIFS Cel V/201).*

27. Prunus marsupialis Kalkm., *nom. nov.* — *Pygeum glandulosum* Merr., Philip. J. Sc. 3 (1908) Bot. 226; Elm., Leafl. Philip. Bot. 5 (1913) 1621; Koehne, Bot. Jahrb. 51 (1913) 205; Koehne, Bot. Jahrb. 52 (1915) 337; Merr., Enum. Philip. 2 (1923) 233. —

Pygeum pubescens Merr., Philip. J. Sc. 9 (1914) Bot. 359; Merr., Enum. Philip. 2 (1923) 234. — **Fig. 26.**

Typification. *Pygeum glandulosum, Prunus marsupialis:* Merrill cited with his description no less than 26 specimens, without designation of a holotype. Lectotype chosen by me: *Williams 642*, holotype in A, isotypes seen from K, US.

Pygeum pubescens: Wenzel 333, holotype in PNH (lost), lectotype in A, isotypes seen from BM, US; paratypes: *Rosenbluth FB 12835* (CAL), *Wenzel 18* (A, E, L, US), *39* (A, E, L, US), *217 (non vidi)* and *331* (A, BM, US).

Tree, usually small? (very few data available). *Twigs* pubescent when young, glabrescent, often with distinct, lighter-coloured lenticels. *Leaves* elliptic to oblong or elliptic-ovate to oblong-ovate, (6—)8—13(—16) by 3—6½ cm, index 1¾—3(—3½), base rounded to acute, apex obtuse to acuminate, herbaceous, both surfaces pubescent when young, indumentum almost disappearing with age, except mostly on midrib and main nerves; nerves 5—8 pairs, flat to slightly impressed above, prominent beneath, venation more or less transverse, prominulous beneath; basal glands (fig. 7 h) usually 2 (sometimes 1, occasionally 0), distinctly hollowed, strongly bulging on upper surface, additional glands usually many, flat to hollowed; petiole 5—8 mm, pubescent to subglabrous. *Stipules* usually large and sometimes persistent on the upper nodes, 4—12(—17) by ½—3 mm, index 3—8(—10), hairy on both sides, the inside often less dense, margin glandular to manifestly glandular-serrate. *Racemes* solitary, in axils of leaves or their scars, up to 7(—10½) cm long during anthesis; peduncle short or 0; rachis pubescent. *Bracts* up to 3 mm long, hairy outside, more sparsely so inside, lowermost bracts often tripartite. *Pedicels* 0—1½(—3½) mm, pubescent. *Hypanthium c.* 2 mm high, densely pubescent outside, glabrous inside except for long hairs on bottom. *Perianth segments* 8—12, subequal, or unequal but not distinctly differentiated as sepals and petals, up to 1½ mm long, hairy. *Stamens* 20—30(—40); filaments up to 5 mm, glabrous; anthers 0.3—0.4 mm long. *Ovary* densely hairy, as is lower part of up to 4 mm long style. *Fruits* transversely ellipsoid, very variable in dimensions, 6—11½(—13) by 7½—13(—15½) mm, 1.1—1.4 times as wide as long, sparsely hairy; endocarp thin, glabrous, only rarely with some hairs; seedcoat glabrous.

Distribution. Philippines (Luzon, Mindoro, Samar, Leyte, Bohol, Negros, Panay).

Ecology. Forest, according to Merrill (1923) ascending to 1500(—2000) m. On only nine of the more than 100 specimens examined, the altitude was noted, the highest record being 1100 m.

Compilation of field-notes. Wood once noted to be used for logs. Flowers greenish or whitish, anthers yellow. Fruits green when young, becoming white, red, and ultimately black.

Remarks. The epithets *glandulosa* and *pubescens* have both been used in *Prunus*, resp. by Thunberg (1784) and by Pursh (1814). The new epithet chosen refers to the deeply hollowed basal glands which, among other characters, distinguish this species from the other common Philippine one, *Prunus grisea* var. *grisea*.

28. Prunus rubiginosa (Elm.) Kalkm., *comb. nov.* — *Pygeum rubiginosum* Elm., Leafl. Philip. Bot. 5 (May 1913) 1624; Koehne, Bot. Jahrb. 51 (Dec. 1913) 205; Koehne, Bot. Jahrb. 52 (1915) 337; Merr., Enum. Philip. 2 (1923) 234. — *Pygeum elmerianum* Koehne, Bot. Jahrb. 51 (Dec. 1913) 206; Merr., Enum. Philip. 2 (1923) 232.

Typification. *Pygeum rubiginosum: Elmer 11857*, holotype in PNH (lost), lectotype in A, further isotypes seen from BM, BO, CAL, E, K, L, US; paratype: *Elmer 14067* (A, BM, BO, CAL, E, K, L, US).

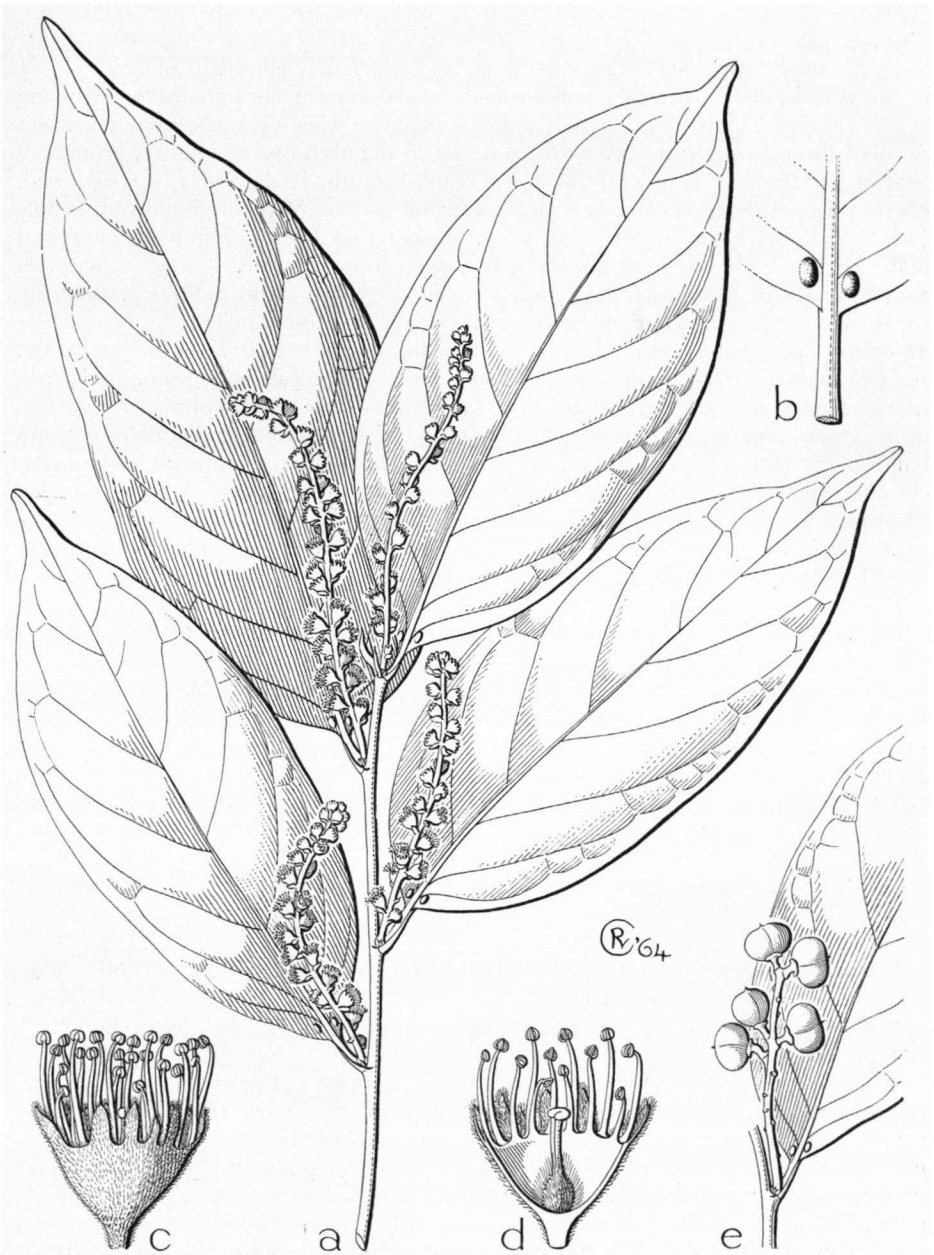

Fig. 26. *Prunus marsupialis*. — a. flowering twig (× $\frac{2}{3}$); b. leaf-base with bulging glands, seen from above (× 2); c. flower, and d. halved flower (× 4); e. infructescence (× $\frac{2}{3}$). (from *Loher 2225*).

Pygeum elmerianum: Elmer 12210, holotype in L, isotypes seen from A, BM, BO, CAL, E, US.

Tree. *Twigs* shortly pubescent, rapidly glabrescent. *Leaves* elliptic to oblong, 7—15½ by 3—7½ cm, index 2—3, base acute or rounded and decurrent, apex gradually narrowing or subacuminate, herbaceous, sparsely puberulous above when young, sparsely pubescent to subglabrous beneath; nerves 7—10 pairs, flat to slightly impressed above, prominent beneath, venation not very conspicuous, but visible beneath; basal glands 1 or 2, hollowed, often in part of the leaves absent, additional glands present, often also hollowed; petiole ½—1½ cm, sparsely pubescent to glabrous. *Stipules* 3—6 by 1—1¾ mm, index 2½—5, pubescent on both sides, margin glandular, sometimes serrulate. *Racemes* solitary, in axils of leaves or their scars, 2—7 cm; peduncle 0—½ cm; rachis pubescent. *Bracts* up to 1½ mm long, pubescent on both sides. *Pedicels* 0—1 mm, pubescent. *Hypanthium* 2½—3 mm high, pubescent outside, on inside with hairs on bottom and some higher up. *Perianth segments* 10—12, not regularly differentiated as sepals and petals, but partly more or less sepal-like, partly more or less petal-like (longer and with narrower base), up to 2 mm long. *Stamens* 60—75; filaments *c.* 3½ mm, glabrous; anthers 0.3—0.5 mm long. *Ovary* more or less densely hairy; style *c.* 5 mm. *Fruits* compressed-subglobular, ellipsoid when young, up to 17 by 16 mm, almost glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. Philippines (1 specimen from Sibuyan: Mt Giting-Giting; 2 specimens from Mindanao: Mt Urdaneta, Mt Apo). — Fig. 25.

Ecology. Probably a montane species, *c.* 1200 m altitude.

Remarks. This is a not well-known species, most probably related to *P. fragrans.*

29. Prunus fragrans (Elm.) Kalkm., *comb. nov.* — *Pygeum fragrans* Elm., Leafl. Philip. Bot. 2 (1908) 475, *pro parte;* Elm., Leafl. Philip. Bot. 5 (1913) 1622; Koehne, Bot. Jahrb. 51 (1913) 205; Merr., Enum. Philip. 2 (1923) 232. — *Parinarium coccineum* Elm., Leafl. Philip. Bot. 2 (1909) 578. — *Pygeum coccineum* (Elm.) Elm., Leafl. Philip. Bot. 5 (1913) 1621; Koehne, Bot. Jahrb. 52 (1915) 336; Merr., Enum. Philip. 2 (1923) 232. — *Pygeum megaphyllum* [Elm., Leafl. Philip. Bot. 5 (1913), *nomen*] Merr., Philip. J. Sc. 10 (1915) Bot. 312; Merr., Enum. Philip. 2 (1923) 233.

Typification. *Pygeum fragrans:* lectotype: *Elmer 7504*, holotype in A, isotypes seen from BO, E, K, L. The other specimen cited by Elmer *(Elmer 7662)* belongs to *Prunus marsupialis.*

Parinarium coccineum and *Pygeum coccineum: Elmer 9787*, holotype in PNH (lost), lectotype in L, isotypes seem from BO, E.

Pygeum megaphyllum: Ramos BS 14923, holotype in PNH (lost), lectotype in US, isotype seen from K.

Tree. *Twigs* sparsely pubescent when young, glabrescent. *Leaves* elliptic or elliptic-ovate to oblong, 10—18(—23) by (4½—)6—10(—13) cm, index 1¾—3, base acute to rounded and shortly decurrent, apex usually acuminate, herbaceous, rarely slightly coriaceous, upper surface usually still sparsely pubescent on midrib and nerves when mature, sparsely pubescent to glabrous beneath; nerves 6—10 pairs, flat or slightly sunken above, prominent beneath, venation rather inconspicuous above, not very distinct but usually visible beneath; basal glands 2, hollowed, distinctly or only slightly bulging above, additional glands present, often also hollowed; petiole 1—2½ cm, sparsely pubescent to glabrous. *Stipules* 4—8 by 1½—3 mm, index 1½—4, hairy outside, with some hairs or glabrous inside, margin glandular or glandular-serrate. *Racemes* solitary, in axils of leaves or their scars, up to 8 cm, in fruit up to 14 cm; peduncle usually less

than ½ cm; rachis pubescent. *Bracts* tripartite at base of raceme, more or less grading into ovate ones, from 4 by 4 mm to 5 by 3 mm, hairy on both sides, denser outside, margin more or less distinctly toothed-glandular. *Pedicels* 1½—4(—5) mm, pubescent. *Hypanthium* 2½—3½ mm high, densely pubescent outside, on the inside with hairs on bottom and some few higher up. *Perianth segments* 10—13, subequal, up to 1½ mm long, densely hairy. *Stamens c.* 25—55; filaments up to 7 mm, glabrous; anthers 0.5—0.7 mm long. *Ovary* with a ring of hairs around base, often also some few hairs higher up; style up to 6½ mm, sometimes with a few hairs. *Fruits* ellipsoid, 21—30 by 14—17 mm, 1½—2 times as long as wide, glabrous; mesocarp rather hard when dry, *c.* 1 mm thick, endocarp sparsely hairy; seedcoat glabrous.

Distribution. Philippines (Camiguin, Luzon, Negros, Panay). — Fig. 25.

Ecology. Forest. Two collections only (of the 15 seen) bear data on the altitude: 600 m, 2100 m.

Compilation of field-notes. 'Calyx orange, white towards apex, petals, stamens, ovary white' *(Steiner 2212).*

Remarks. The 'typical' *fragrans* has oblong leaves (index 2½—3) with acute base, 'typical' *megaphyllum* has elliptic or elliptic-ovate leaves (index 1¾—2) with rounded and shortly decurrent base. Intermediate forms, however, link the extremes.

The basal leaf-glands are not of exactly the same appearance as in the related species *P. marsupialis, P. rubiginosa* and *P. clementis.* They are less deeply hollowed (and consequently not as distinctly bulging above), and the outgrown rim of the excavation partly covers the 'entrance' to the gland beneath.

30. Prunus dolichobotrys (Laut. & K. Sch.) Kalkm., *comb. nov.* — *Pygeum dolichobotrys* Laut. & K.Sch., Fl. Schutzgeb. (1901) 340; *ibid.*, Nachtr. (1905) 274; Koehne, Bot. Jahrb. 51 (1913) 210. — *Combretum flavovirens* Laut., Nova Guinea 8 (1912) 847. — **Fig. 27.**

Typification. *Pygeum dolichobotrys: Rodatz & Klink 168*, holotype (and probably the only specimen) in B (lost). Designation of neotype: *Schlechter 14700*, holotype in K, isotypes seen from BM, BO, P. This specimen was mentioned by Lauterbach & Schumann, l.c. (1905).

Combretum flavovirens: Gjellerup 577, holotype in BO, isotype seen from L. Reduced to *Pygeum dolichobotrys* by Diels, Bot. Jahrb. 57 (1922) 427, but Hallier *f.*, Med. Rijksherb. n. 35 (1918) 33, already recognized it as a *Pygeum.*

Tree, up to 25(—30) m. *Twigs* glabrous, often with distinct lenticels. *Leaves* elliptic to ovate, (8—)12—26 by (4—)7—15 cm, index 1½—2(—2½), base rounded to subcordate, apex rounded to shortly and broadly acuminate, entirely glabrous, herbaceous; nerves (7—)9—14 pairs, more or less flat above, prominent beneath, venation transverse, not very conspicuous; basal glands 2—4(—6), flat or slightly hollowed, additional glands few or none; petiole up to 1½(—2) cm. *Stipules* linguiform, 5½—7½ by 1½—2¼ mm, index 3—4, keeled inside and often intrapetiolarly connate, glabrous but sometimes ciliolate. *Racemes* solitary, axillary, (4—)8—15 cm, up to 22 cm in fruit; peduncle up to *c.* 1½ cm; rachis glabrous, more rarely sparsely puberulous. *Bracts* caducous, 2—3 mm long, sparsely puberulous outside, glabrous inside, ciliolate, the lower bracts of the raceme empty (fig. 5 c). *Pedicels* 1½—5 mm, glabrous or more rarely sparsely puberulous. *Hypanthium* 2—3 mm high, glabrous outside or almost so, inside only with hairs on the bottom. *Perianth* usually neatly distinguished in 5 sepals and 5 petals, rarely 4-merous, rarely with supernumerary petals; sepals trigonous, ¾—1½ mm long, glabrous except sometimes apex and margins; petals lighter-coloured, elliptic to obovate, 1—2 mm long,

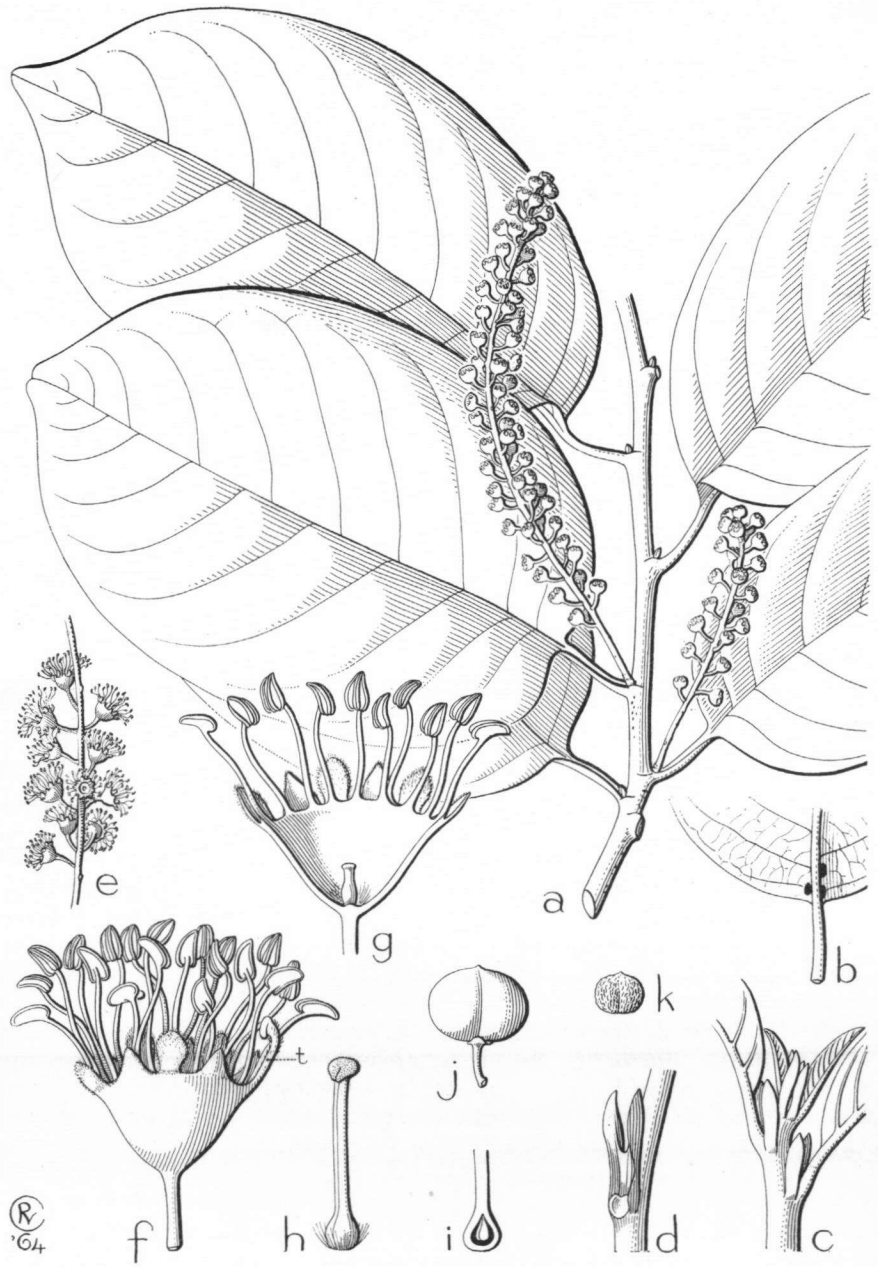

Fig. 27. *Prunus dolichobotrys*. — a. twig with young inflorescences (×⅔); b. leaf-base with glands, seen from beneath (×⅔); c. young shoot, showing the stipules (× 1); d. connate stipules, leaf removed (× 2); e. part of male raceme (×⅔); f. male flower, and g. the same halved (× 4) (t = transition of petal to stamen); h. pistil from bisexual flower (× 4); i. ovary, length section (× 4); j. fruit (× 1); k. seed (× 1). (a, b, e. from *Hoogland 3966*; c, d. from *Brass 7308*; f, g. from *Womersley NGF 3700*; h, i, j, k. from *Darbyshire & Hoogland 8249*).

usually more hairy than sepals. *Stamens* 10—30; filaments up to 6 mm, glabrous; anthers ¾—1½ mm long. *Ovary* glabrous; style up to 4½ mm; stigma rather large; the male flowers, which are not rare, with small pistillode. *Fruits* transversely ellipsoid to didymous, 8—11 by 11—15 mm, 1.2—1.6 times as wide as long, glabrous; endocarp glabrous, rarely with some hairs; seedcoat glabrous.

Distribution. Throughout New Guinea (also Woodlark I.), Bismarck Arch. (New Ireland) — Fig. 28.

Ecology. From sea-level up to 1600 m., in primary and secondary forest, often reported from riversides, sometimes from ridges.

Compilation of field-notes. Trunk once reported as 'prominently, narrowly spur-buttressed'. Outer bark greyish brown to greenish black, inner bark straw-coloured, bark smelling of bitter almonds. Wood white to straw-coloured, heartwood not differentiated. Leaves said to be dark (glossy) green above. Flowers reported as white or cream, a more detailed description on *Gjellerup 577* runs: 'calyx yellowish green, stamens and pistil pink, anthers and stigma brownred.' Fruits showing the usual sequence of green, white, red, purple and almost black.

Remarks. Relationships are with *P. gazelle-peninsulae*, see below, and especially with *P. grisea* and *P. ceylanica.*

31. Prunus gazelle-peninsulae (Kan. & Hat.) Kalkm., *comb. nov.* — *Pygeum platyphyllum* K. Sch. *in* K. Sch. & Laut., Fl. Schutzgeb., Nachtr. (1905) 273; Koehne, Bot. Jahrb. 51 (1913) 211. — *Pygeum gazelle-peninsulae* Kan. & Hat., Bot. Mag. Tokyo 52 (1938) 355, fig. 1 *('gazelle-peninsulum'), e descr.*

Typification. *Pygeum gazelle-peninsulae: Kanehira 3966*, in FU *(non vidi).*

Pygeum platyphyllum: Nyman 593, holotype in B (lost), lectotype in UPS, isotype seen from L.

Tree, up to 37 m. *Twigs* pubescent when young, glabrescent, usually distinctly lenticelled when older. *Leaves* elliptic to ovate, rarely oblong, 10—20(—25) by 6—11 (—14) cm, index 1½—2½, base rounded to subcordate, apex rounded or shortly acuminate, herbaceous, more or less densely pubescent when young, glabrescent but nearly always at least the midrib remaining hairy; nerves 9—14(—17) pairs, slightly impressed to flat above, prominent beneath, venation transverse, slightly impressed to almost invisible above, rather prominent beneath; basal glands mostly 4, flat to slightly hollowed, additional glands none to rather many; petiole up to 1½(—2) cm, pubescent. *Stipules* triangular to ovate, 3—6 by 1¼—2 mm, index 1½—3, strongly keeled inside and with the lower parts of the keels often intrapetiolarly connate, pubescent outside, sparsely so to glabrous inside. *Racemes* solitary, in axils of extant or fallen leaves, 5—14 cm, in fruit up to 18 cm; peduncle less than ½ cm; rachis densely pubescent. *Bracts* up to 3½ mm long, pubescent outside, sparsely so to glabrous inside, some empty ones often present at base of raceme, lowermost ones tridentate. *Pedicels* hardly exceeding 1 mm, rarely up to 4 mm, under the fruit up to 1 cm, pubescent. *Hypanthium* 2½—4 mm high, densely pubescent outside, with scattered long hairs inside (denser on the bottom). *Perianth* differentiated as sepals and petals, 5-merous; sepals triangular to linguiform, 1—2 mm long, densely hairy; petals elliptic to oblong, 1—2 mm long, also hairy. *Stamens* 18—40; filaments up to 8 mm, glabrous; anthers 1—1½ mm long. *Ovary* glabrous except around insertion; style up to 4½ mm; pistillode in the male flowers small to minute. *Fruits* transversely ellipsoid, 8—12 by 11—17 mm, 1.2—1.4 times as wide as long, glabrous except around insertion; fruiting-calyx 2—3½ mm diam.; endocarp hairy inside, rarely glabrous; seedcoat densely hairy.

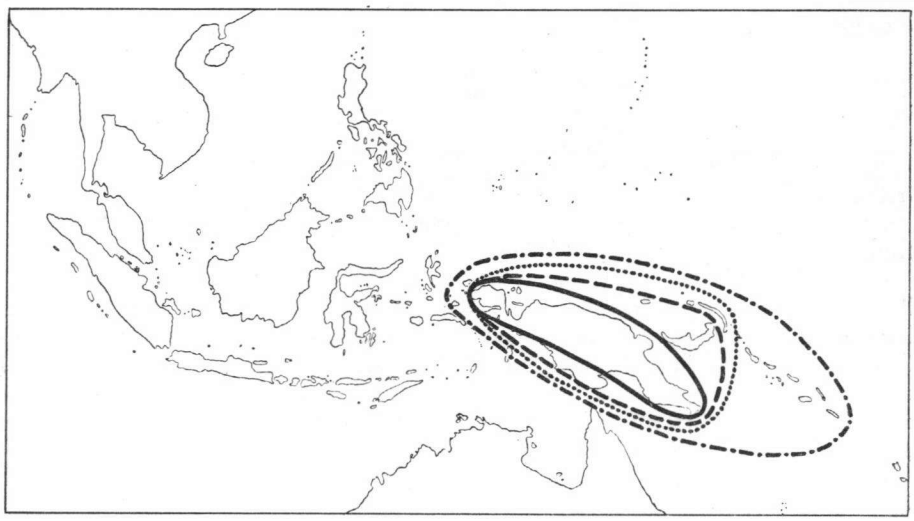

Fig. 28. Distribution of 30. *P. dolichobotrys* (. . . . . .), 31. *P. gazelle-peninsulae* (— — — —), 32. *P. costata* (————), 33. *P. schlechteri* (—.—.—).

Distribution. Throughout New Guinea (although probably more abundant in the eastern part), Bismarck Arch. (New Britain). — Fig. 28.

Ecology. Primary rain-forest, secondary forest, 0—1600 m.

Compilation of field-notes. Bark 4—9 mm, outer bark grey or brown, smooth, inner bark brown, smelling of bitter almonds. Sapwood light-coloured, yellowish to pinkish, heartwood pink to darkbrown. Leaves probably dark green and shining above, lighter-coloured and dull beneath. Racemes pendant *in vivo*. Flowers cream-coloured to white. Fruits green, white, red, purple, finally black.

Remarks. This species is closely related to *P. costata*, see p. 79.

Another common, large-leaved New-Guinea species is *P. dolichobotrys*. In fruit they can easily be distinguished *(dolichobotrys* has a glabrous seed), with flowering material one has to rely on the leaves (more or less hairy in the present species, glabrous in *dolichobotrys)*, and on the outside of the hypanthium (densely pubescent in *gazelle-peninsulae*, glabrous or almost so in *dolichobotrys)*.

P. gazelle-peninsulae is a pronouncedly polygamous species: of the 40 fertile specimens seen 17 had only male flowers, 21 had bisexual flowers or fruits, the remaining two were too young to determine the sex of the flowers.

Prunus platyphylla Gand. (1875) makes use of the oldest, and more appropriate epithet impossible. Although I did not see the type specimen of *Pygeum gazelle-peninsulae*, I have not the slightest doubt about its identity.

32. Prunus costata (Hemsl.) Kalkm., *comb. nov.* — *Pygeum costatum* Hemsl., Kew Bull. 1898 (1901) 98; Koehne, Bot. Jahrb. 51 (1913) 209. — *Pygeum papuanum* Hemsl., Kew Bull. 1898 (1901) 99; Koehne, Bot. Jahrb. 51 (1913) 210. — *Pygeum rigidum* Koehne, Bot. Jahrb. 52 (1915) 339, *e descr.* — *Pygeum retusum* Merr. & Perry, J. Arn. Arb. 21 (1940) 195.

Typification. *Pygeum costatum: Giulianetti (via McGregor) s.n.* from Mt Scratchley, holotype in K, no isotypes seen.

Pygeum papuanum: Giulianetti (via Mc Gregor) s.n., from Mt Scratchley, holotype in K, no isotypes seen.

Pygeum rigidum: Ledermann 11453 (non vidi).

Pygeum retusum: Brass 9035, holotype in A, isotypes seen from BO, L; paratypes: *Brass 9103* (A, BO, L), *Brass & Meijer Drees 10428* (A, L), *Brass & Meijer Drees 10439 (non vidi).*

Tree, up to 22 m, but usually smaller, or shrub. *Twigs* glabrous, probably sparsely pubescent when very young. *Leaves* elliptic to oblong, more rarely widest below the middle and elliptic-ovate, 4½—13(—16) by 2½—7 cm, index 1½—2½, base usually rounded, rarely acute, apex obtuse or shortly and bluntly acuminate, often retuse, stiff-leathery, upper surface glabrous, lower surface glabrous, dotted, puberulous only when very young; nerves 6—10(—14) pairs, with the venation slightly impressed above and there often more conspicuous than beneath where the nervation is more or less flat; basal glands 2 or 4, flat, rarely 0, additional glands absent; petiole up to 1 cm, glabrous. *Stipules* 2½—9 by 1½—3½ mm, index 1½—4, sparsely hairy or glabrous outside, glabrous inside, usually ciliolate. *Racemes* solitary, in axils of leaves or their scars, 3—12 cm; peduncle up to 1 cm; rachis sparsely pubescent. *Bracts* (few seen) *c.* 1 mm long, sparsely pubescent outside, glabrous inside. *Pedicels* 1—4 mm, up to 8 mm under the fruit, sparsely pubescent. *Hypanthium* 2—3(—4) mm high, sparsely pubescent to almost glabrous outside, on the inside only with some hairs on the bottom. *Perianth* (fig. 1 c) regularly 4-, 5-, or 6-merous, exceptionally irregular, hairy outside, glabrous inside; sepals triangular to ovate, 1—2 mm long; petals ovate to elliptic, 1—3 mm long, usually longer than sepals. *Stamens* 20—35; filaments up to 5½ mm, glabrous; anthers ½—1 mm long. *Ovary* glabrous; style up to 4 mm. *Fruits* transversely ellipsoid, 7—10 by 8½—11½ mm, 1.1—1.4 times as wide as long, glabrous; fruiting-calyx sometimes large, 2—5 mm diam.; endocarp usually hairy, rarely glabrous; seedcoat hairy, sometimes only sparsely so.

Distribution. Throughout New Guinea, from Arfak Mts to Mt Albert Edward and Mt Scratchley. — Fig. 28.

Ecology. In montane forest and in more open subalpine habitats: mossy thickets, ridges, crests, also in fire-vegetation, 1500—3700 m.

Compilation of field-notes. Bark 4—15 mm, redbrown to black, usually rough. Wood usually differentiated in yellowish to white sapwood and red to brown heartwood. Flower usually noted as white (petals, filaments, and style), anthers brown, inside of hypanthium once said to be orange. Fruits from green *via* red, turning purplish. Only one *vernacular* noted more than once: *(H)agruk* in Mendi language.

Remarks. The types of *Pygeum costatum* and *papuanum* are from the same locality, and represent the extremes of variability as to leaf-size: *costatum* the minimum, *papuanum* the maximum. These are connected, however, by a whole scala of intermediate sizes.

Prunus gazelle-peninsulae is a nearly related species from the lowland, which has larger and more hairy leaves, more hairy flowers, and, most important, usually connate stipules.

When sterile, the species is often hardly or not distinguishable from *Prunus grisea* var. *grisea.*

33. Prunus schlechteri (Koehne) Kalkm., *comb. nov.* — *Pygeum schlechteri* Koehne, Bot. Jahrb. 51 (1913) 210. — *Pygeum forbesii* Koehne, Bot. Jahrb. 51 (1913) 210. — *Pygeum laurocerasus* Koehne, Bot. Jahrb. 51 (1913) 208, *e descr. et spec. ster.* — *Pygeum tetradenium* Koehne, Bot. Jahrb. 52 (1915) 341, *e descr. et typi fragm.* — *Pygeum salomonense* Merr. & Perry, J. Arn. Arb. 21 (1940) 196.

Typification. *Pygeum schlechteri: Schlechter 17621*, holotype in B (lost), lectotype in P, other isotypes seen from BR, K.

Pygeum forbesii: Forbes 529, holotype in L. The specimen is in a rather bad state, its identity is not quite certain.

Pygeum laurocerasus: Schlechter 18621, holotype in B (lost), sterile isotype seen from P.

Pygeum tetradenium: Ledermann 7889, holotype in B (lost), fragment of isotype seen from K.

Pygeum salomonense: Brass 2727, holotype in A *(non vidi)*, isotypes seen from BO, L.

Tree, up to 35 m. *Twigs* sparsely to densely pubescent, glabrescent. *Leaves* elliptic to oblong, rarely more ovate, 6—15(—20) by 2—8(—10) cm, index 2—3(—4), base rounded or acute, apex tapering or acuminate, sparsely to densely hairy when young, upper surface becoming glabrous or almost so, lower surface usually still more or less densely pubescent when mature, but sometimes (sub-)glabrous, herbaceous to coriaceous; nerves 6—13 pairs, slightly impressed to flat above, (rather) prominent beneath, venation usually inconspicuous to almost invisible; basal glands 2—6, flat, rarely absent, additional glands few or none; petiole ½—1 cm, pubescent, glabrescent. *Stipules* 2½—6(—14) by 1—2½ mm, index 1½—3(—5½), pubescent outside, pubescent to glabrous inside, with marginal glands. *Racemes* solitary, in axils of leaves or their scars, 1½—7 cm, in fruit up to 10 cm; peduncle up to ½ cm; rachis densely pubescent. *Bracts* up to 3 mm long, pubescent outside, glabrous inside. *Pedicels* 0—2(—4) mm, densely pubescent. *Hypanthium* 1½—2½ mm high, hairy outside, inside with hairs on bottom only, rarely also some hairs higher up. *Perianth segments* 7—13, subequal or more or less unequal, but not regularly biseriate, up to 2 mm long, but usually shorter, hairy. *Stamens* 15—40; filaments up to 4 mm long, hairy at base or glabrous; anthers ½—1 mm long. *Ovary* densely hairy; style up to 3 mm, often also hairy. *Fruits* compressed subglobular to didymous, 9—16 by 10½—19(—23) mm, (0.9—)1—1.5 times as wide as long, usually still hairy when mature; endocarp glabrous or sparsely hairy; seedcoat hairy, but often only sparsely so, sometimes with hairs near hilum only.

Distribution. Throughout New Guinea (also Misool I. and Job I.), Solomon Is (New Georgia, S. Ysabel, Guadalcanal, Malaita, S. Christoval). — Fig. 28.

Ecology. Lowland and montane rainforest, sometimes in secondary forest, 0—2500 m.

Compilation of field-notes. Small buttresses rather often recorded. Bark brown to darkbrown, usually smooth, outer bark ½—1 mm, inner bark 6—12 mm, blaze some shade of red or brown, often said to darken rapidly after exposure, with distinct almond smell. Wood pinkish to lightbrown, heartwoord usually not differentiated. Flowers cream-coloured, inside of hypanthium bright orange *(Havel & Kairo NGF 11138)*, anthers yellow. Fruits green when young, *via* yellow and red turning purplish black (on several montane specimens ripe fruits are recorded as red, not as black, but possibly those fruits were not entirely ripe). *Vernaculars:* in Vogelkop Penins. *Sissemohi* is twice reported (Manikion language, also reported for other species, e.g. *P. javanica); Hy-imbi-ura* is twice reported by Kajewski from Guadalcanal I.; *Aimangelo* six times reported from different islands of the Solomon Arch. (Kwara'ae lang.). *Uses:* Kajewski said that a macerate of the bark is applied to aching teeth (Malaita I.) and sore legs (Guadalcanal I.).

Remarks. Although the altitudinal range of this species is large and the morphological variation in indumentum of leaves and shape and dimensions of fruits rather considerable, it has appeared to be impossible to distinguish more than one species within the complex. A vague correlation is present between altitude and shape of fruit: the lowland specimens usually have transversely ellipsoid or didymous fruits, whereas those of the montane specimens are often more subglobular.

Related species are *P. brassii* (a little known species with smaller fruits) and *P. glomerata* and *P. turneriana* (which both have much larger fruits with a distinctly thicker endocarp).

34. Prunus glomerata (Koehne) Kalkm., *comb. nov.* — *Pygeum glomeratum* Koehne, Bot. Jahrb. 52 (1915) 340.

Typification. *Ledermann 9497*, holotype in B (lost), lectotype in L, isotype seen from K.

Tree, up to 30 m. *Twigs* densely woolly pubescent, glabrescent. *Leaves* (broadly) elliptic or more ovate or obovate, 7—15(—22) by 4—12 cm, index 1½—2, base rounded or more acute, apex rounded or acute, densely pubescent when young, on upper surface the midrib and nerves usually still densely hairy when mature, the lower surface remaining more or less densely pubescent, hard and stiff when dry; nerves 7—10(—15) pairs, impressed above, prominent beneath, venation transverse, impressed above, usually rather conspicuous beneath; basal glands 2—4, flat, additional glands absent; petiole ½—1½ cm, densely woolly pubescent. *Stipules* large, 10—12 by 7—10 mm, index 1—1¾, pubescent on either side. *Racemes* solitary, in axils of fallen leaves, 2—9 cm; peduncle 0; rachis densely pubescent. *Bracts* large, up to 7 mm long, pubescent outside, glabrous inside except at base; bracteoles (always?) present at the base of the hypanthium. *Pedicels* 0—2 mm. *Hypanthium* 2½—3½ mm high, densely pubescent outside, inside with hairs on bottom and sometimes also higher up. *Perianth* biseriate, 5—7-merous, the two whorls not very different in dimensions (up to 1½ mm long) but petals thinner and with narrower base. *Stamens* 15—50; filaments up to 4½ mm, hairy at base; anthers 1—1¼ mm long. *Ovary* hairy; style up to 4 mm, hairy. *Fruits* compressed subglobular, 24—33 by 24—34 mm, 18—25 mm thick, still hairy when ripe; mesocarp *c.* ⅜ mm thick *in sicco*, endocarp woody, *c.* 1 mm thick, hairy; seedcoat hairy.

Distribution. New Guinea, eastern part (Sepik region, Morobe Distr., SE. Papua). — Fig. 29.

Ecology. Forest, 600—2300 m.

Compilation of field-notes. Bark (once noted) greyish brown, underbark tan, blaze straw-coloured. *Brass 29719* noted 'young leaves conspicuously golden pubescent'. Petals white, anthers brown. Fruits green, later red.

Remarks. This species has the largest fruits known in subg. *Laurocerasus*, it is furthermore characterized by the compact racemes with the (sub)sessile flowers in axils of large bracts. The hairy style is also a rather uncommon, although not unique, character.

A close relationship exists with *P. turneriana* which also has large fruits with a thick endocarp.

35. Prunus turneriana (F. M. Bail.) Kalkm., *comb. nov.* — *Pygeum turnerianum* F. M. Bail., Bot. Bull. Queensl. Dep. Agr. 8 (1893) 75; F. M. Bail., Queensl. Fl. 2 (1900) 525, pl. 19; Koehne, Bot. Jahrb. 51 (1913) 211.

Typification. *Pygeum turnerianum: Cowley s.n.*, holotype probably in BRI *(non vidi)*, isotypes seen from BM, K; paratypes: *Palmerston (s.n.?)*, *Meston (s.n.?)*, loose fruits, probably also in BRI *(non vidi)*.

Tree, 6—30 m. *Twigs* pubescent, rapidly glabrescent. *Leaves* ovate, or elliptic to oblong, 9—20 by 4½—11 cm, index 1½—2½, base rounded or acute, apex acute, herbaceous, often thin when dry, (almost) glabrous above, sparsely pubescent on the nerves beneath; nerves 7—12 pairs, flat to slightly impressed above, prominent beneath, venation more or less transverse, inconspicuous above, conspicuous to rather prominent beneath; basal glands 2—6, flat, additional glands absent; petiole ½—1 cm, sparsely pubescent to glabrous. *Stipules* 4—7 by 1—3 mm, index 2—5, pubescent outside, glabrous inside,

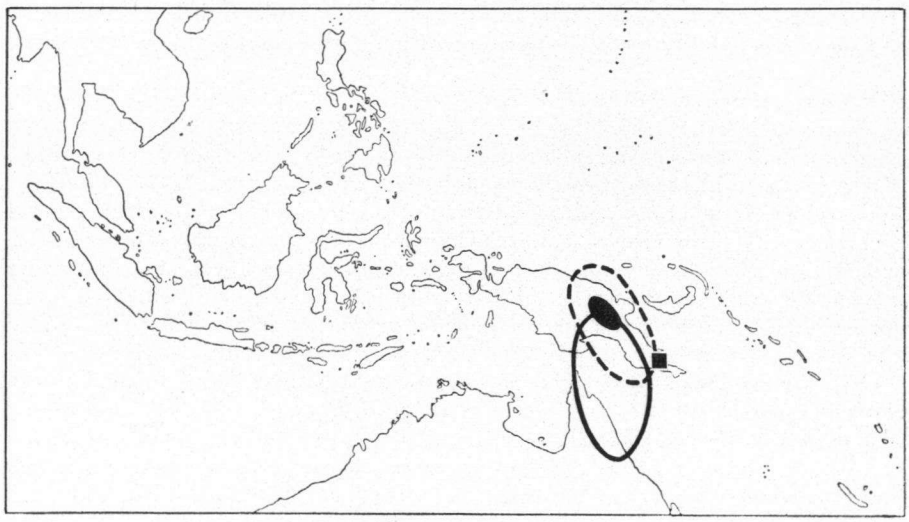

Fig. 29. Distribution of 34. *P. glomerata* (— — — —), 35. *P. turneriana* (————), 36. *P. brassii* (■), 37. *P. oligantha* (in solid black).

marginal glands present. *Racemes* solitary, in axils of extant or fallen leaves, 2½—6 cm, in fruit up to 12 cm; peduncle very short; rachis pubescent. *Bracts* almost 2 mm long, pubescent outside, glabrous inside. *Pedicels* up to 1½ mm or flowers subsessile. *Hypanthium* 2—3 mm high, pubescent outside, on the inside only hairs on the bottom, sometimes also higher up. *Perianth segments* 10—12, possibly sometimes regularly divided into sepals and petals, but usually not so, the lobes up to 1½ mm long, hairy. *Stamens* 15—?35; filaments up to 3 mm, glabrous; anthers 0.5—0.8 mm long. *Ovary* densely hairy; style up to 5 mm, sometimes also hairy. *Fruits* large, compressed, subglobular to transversely ellipsoid, 17—27 by 18½—27 mm, 10—16 mm thick, slightly longer than wide to 1¼ times as wide as long, usually still sparsely hairy; mesocarp rather thick (—3 mm?) and fleshy *in vivo*, up to 1 mm thick *in sicco;* endocarp woody, ¾—1 mm thick, hairy; seedcoat sparsely to more densely hairy, especially near the apex.

Distribution. East New Guinea (Papua: S. Highl. Distr., Central Distr., North. Distr.), Australia (Queensland). — Fig. 29.

Ecology. Rain-forest, 300—800 m.

Compilation of field-notes. Bark grey-brown, with pustular lenticels in longitudinal rows (once noted). Wood straw-coloured (once noted). Flowers yellowish. Fruits green when young, *via* red and purple turning black.

Remarks. Distinctly related to *P. glomerata:* both species have large, thick-walled fruits, for the differences see the key. It is certainly possible that in future the separation of the species will appear to be untenable.

Especially the flowers of *P. turneriana* are insufficiently known.

36. Prunus brassii Kalkm., *spec. nov.*

Type: *Brass 22814*, holotype in L, no isotypes seen but certainly distributed.

Rami dense pubescentes, glabrati. Folia elliptica vel elliptico-oblonga, 4—8½ × 2—3½ cm, apice retusa, dense tomentosa, adulta subglabrata, nervis utrinque 6—9,

glandibus basalibus 2, planis; petiolus ½—1¼ cm longus. Racemi solitarii, axillares, 1½—4½ cm, dense pubescentes. Pedicelli 1—4 mm. Hypanthium 2—3 mm altum. Perianthii lobi 10—12, 1—1½ mm longi, parum inaequales; sepala petalis paulo brevioria, sed basi latiora. Stamina 20—30. Ovarium dense pubescens. Drupa transverse ellipsoidea, 6—7½ × 7—9 mm, pubescens; testa pubescens.

Tree up to 30 m. *Twigs* densely pubescent, glabrescent. *Leaves* elliptic to elliptic-oblong, 4—8½ by 2—3½ cm, index 2—2½, base acute to more or less rounded, apex obtuse and retuse, very hard and stiff when dry, densely woolly pubescent when young, becoming glabrous and dotted when mature, but hairs on under-surface remaining longer than those above; nerves 6—9 pairs, impressed above, visible but not prominent beneath, venation slightly impressed above, rather inconspicuous beneath; basal glands usually 2, rather conspicuous, flat, rarely 1 or more than 2, additional glands absent; petiole ½—1¼ cm, densely pubescent, glabrescent. *Stipules* (mature ones not seen) *c.* 2½ mm long, index 2, densely hairy outside, glabrous inside. *Racemes* solitary, in axils of leaves or their scars, 1½—4½ cm; peduncle 0—½ cm; rachis densely pubescent. *Bracts* 1—2 mm long, densely pubescent outside, glabrous inside, lowermost ones with tridentate apex. *Pedicels* 1—4 mm, densely pubescent. *Hypanthium* 2—3 mm high, densely pubescent outside, on inside only with hairs on bottom. *Perianth segments* 10—12, unequal and more or less differentiated as sepals and petals (sepals slightly shorter and with broader base), but the two whorls not entirely regular, 1—1½ mm long, densely hairy outside. *Stamens* 20—30; filaments up to 3½ mm, glabrous or hairy at base; anthers 0.5—0.8 mm long. *Ovary* densely hairy; style up to 2½ mm, glabrous. *Fruits* transversely ellipsoid, 6—7½ by 7—9 mm, *c.* 1.2 times as wide as long, still hairy; endocarp sparsely hairy; seedcoat hairy.

Distribution. East New Guinea, only known from Mt Dayman (Papua, Milne Bay Distr., Maneau Range). — Fig. 29.

Ecology. Mossy forest, *c.* 2000—2300 m.

Compilation of field-notes. Bark pale brown. Leaves stiff. Flowers white to cream-coloured.

Remarks. Known only from 4 specimens, collected by Brass in the same locality. It seems, however, to be a separate species, perhaps most closely allied to *P. schlechteri.*

It is possible that the species is identical with *Pygeum ferrugineum* Koehne, the type specimens of which are lost (see p. 106).

37. Prunus oligantha Kalkm., *spec. nov.* — **Fig. 30.**

Type: *Hoogland & Pullen 5439*, holotype in L, isotype seen from US, but also in CANB and certainly distributed to other herbaria.

Rami dense lanati, glabrati. Folia oblonga vel ovato-oblonga, 4—10 × 1—4 cm, etiam adulta subtus pubescentia, nervis utrinque 5—8, glandibus basalibus vulgo 0, raro 1—2; petiolus ¼—¾ cm. Racemi solitarii, axillares, breves, maxime 10-flores, in anthesi ad 1 cm longi, rachi dense pubescente. Flores sessiles. Hypanthium 2—3 mm altum. Perianthii lobi 6—10, subaequales, 1—1½ mm longi. Stamina 12—25. Ovarium et interdum styli basis pubescentes. Drupa ellipsoidea, 11—12 × 8—11 mm; testa glabra.

Shrub or small tree, up to 10 m. *Twigs* woolly pubescent, glabrescent. *Leaves* oblong to ovate-oblong, 4—10 by 1—4 cm, index 2—3, base acute, rarely rounded, apex acute to acuminate, rather stiff and hard when dry, densely pubescent when young, still pubescent beneath when mature; nerves 5—8 pairs, rather inconspicuous above, not prominent or inconspicuous beneath, venation invisible; basal glands usually absent, rarely 1 or 2, flat, small, additional glands absent; petiole ¼—¾ cm, woolly pubescent,

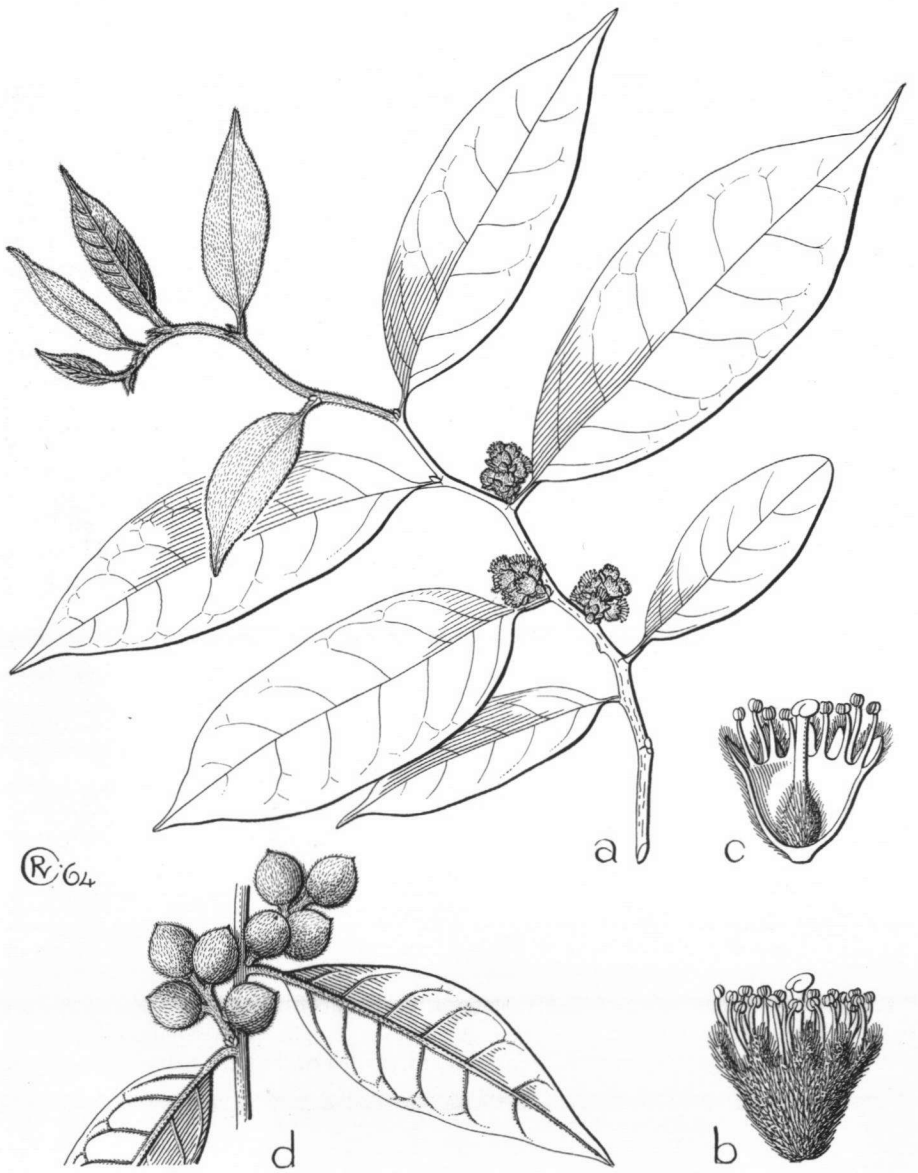

Fig. 30. *Prunus oligantha*. — a. flowering twig (× ⅔); b. flower, and c. halved flower (× 4); d. infructescences (× ⅔) (a, b, c. from *Hoogland & Pullen 5439;* d. from *Vink 16519*).

glabrescent. *Stipules* 2½—5 by 1—1½ mm, index 2—4, pubescent outside, glabrous or almost so inside, marginal glands present. *Racemes* solitary, in axils of usually still extant leaves, with up to 10 flowers, up to 1 cm when flowering and only little longer in fruit; peduncle 0; rachis densely pubescent. *Bracts* 2—3 mm long, pubescent outside, glabrous inside, lower ones empty and often with tridentate apex. *Pedicels* 0. *Hypanthium* 2—3 mm high, pubescent outside, inside only with hairs on bottom. *Perianth segments* 6—10, subequal, 1—1½ mm long, pubescent outside. *Stamens* 12—25; filaments up to 2½ mm, glabrous or slightly hairy at base; anthers *c.* ½ mm long. *Ovary* densely hairy; style up to 3 mm, sometimes hairy at base. *Fruits* ellipsoid, 11—12 by 8—11 mm, still hairy when ripe; endocarp glabrous; seedcoat glabrous.

Distribution. East New Guinea (Terr. New Guinea: several localities in East. and West. Highl. Distr.). — Fig. 29.

Ecology. Undergrowth of montane forest, sometimes in mossy forest, 1900—2900 m.

Compilation of field-notes. Womersley noted on two specimens that the bark does not smell as in most other species. Flowers noted as brownish, with white to cream-coloured stamens and brown anthers. Fruits black when ripe, red or purple when younger. *Uses:* according to *Vink 16519* the bark is used for making waistbelts (cf. *P. sclerophylla* and *P. grisea* var. *microphylla).*

Remarks. Outstanding features are the very short and few-flowered racemes and the ellipsoid fruits.

38. Prunus pullei (Koehne) Kalkm., *comb. nov.* — *Pygeum pullei* Koehne, Bot. Jahrb. 52 (1915) 338.

Shrub or small tree. *Twigs* densely woolly pubescent, tardily glabrescent. *Leaves* elliptic to oblong, 2½—11 by 1½—5 cm, index 1½—2½, base acute to rounded, apex obtuse or rounded, often retuse, more rarely with a short, blunt acumen, rather thick and stiff, densely pubescent when young, glabrescent but usually still rather densely to more sparsely pubescent on lower surface when mature; nerves 5—9 pairs, impressed above, prominent or rather prominent beneath, distinctly looped and joined at 1—2 mm from the margin (this usually only visible from above), venation impressed above and prominent below, or hardly visible on either side; basal glands 2(—4), flat, additional glands absent; petiole ½—1 cm, densely woolly pubescent, tardily glabrescent. *Stipules* 2½—7 by ¾—1¾ mm, index 2—5, pubescent outside, glabrous inside. *Racemes* solitary, in axils of extant or fallen leaves, 1—12 cm; peduncle 0—1½ cm; rachis densely pubescent. *Bracts* 1½—3(—5) mm long, pubescent outside, glabrous inside, lowermost ones sterile and sometimes tridentate. *Pedicels* 0—7 mm, densely pubescent. *Hypanthium* 2—4 mm high, densely pubescent outside, on inside usually only hairs on bottom, sometimes also hairs higher up. *Perianth segments* 8—12, subequal or unequal but not sharply and regularly differentiated as sepals and petals, 1—2 mm long, hairy outside. *Stamens* 15—40; filaments up to 7 mm, glabrous or with some hairs at base; anthers 0.4—1 mm long. *Ovary* densely hairy; style up to 5 mm, glabrous or hairy in basal part. *Fruits* subglobular to transversely ellipsoid, 6—11 by 8—11½ mm, 1.0—1.4 times as wide as long, still hairy; fruiting-calyx 1½—4 mm diam. in specimens from below *c.* 2800 m, 5—8 mm in specimens from higher altitudes; endocarp glabrous or with some hairs; seedcoat glabrous.

Distribution. New Guinea. — Fig. 31.

Ecology. Mossy forest and other types of montane to subalpine forest and scrub, (1800—)2200—3700 m.

Remarks. Within this species two varieties can be distinguished, differing in several

points as shown in the key. Short raceme, short pedicel, and small flower are — as far as seen — always correlated, as are long raceme, long pedicel, and large flower. In most cases the long-racemed specimens have a prominent venation on the lower surface of the leaves, and the short-racemed specimens an inconspicuous one. But *Brass 31397* is a specimen with short racemes and prominent venation, whereas *Clemens 5629* has long racemes but inconspicuous venation.

An additional synonym might be *Pygeum ledermannii* Koehne, the type specimens of which are lost (see p. 106).

KEY TO THE VARIETIES

1. Leaves with a usually hardly visible or entirely invisible venation beneath. Racemes up to 4 cm, rarely longer. Flowers sessile or pedicels up to 3 mm. Hypanthium 2—3 mm high. Tree up to 15 m, or shrub. **a.** var. **pullei**

1. Leaves with a usually prominent venation beneath. Racemes 4—12 cm. Pedicels 2—7 mm. Flowers larger, hypanthium 3—4 mm high. Tree, 6—25 m. . . . . **b.** var. **grandiflora**

a. var. **pullei**

Typification. *Pygeum pullei: Pulle 1005*, holotype in BO, no isotypes seen.

Distribution. Throughout New Guinea (from Arfak Mts to Mt Michael). — Fig. 31.

Compilation of field-notes. Flowers whitish to cream, a more extensive note on *Lam 1865:* 'hypanthium brownish, perianth white inside, pale yellow and golden-pubescent outside, filaments white, anthers pale brown.' Fruits red, turning glossy black.

b. var. **grandiflora** Kalkm., *var. nov.*

Type: *Pullen 252*, holotype in L, no isotypes seen, but certainly distributed.

A typo differt: venatio subtus prominens, racemi longiores, 4—12 cm, pedicelli 2—7 mm longi, flores maiores, hypanthium 3—4 mm altum.

Distribution. East New Guinea (several localities in East. and West. Highl. Distr. and Morobe Distr.) — Fig. 31.

Compilation of field-notes. Bark brown, pustular-lenticelled, inner bark pink to pale brown. Wood straw-coloured. Flowers creamy. Fruits black when ripe. *Vernaculars: Kubanbig(l)* (Hagen language) twice reported, but also applied to other species: *P. sclerophylla, P. grisea* var. *microphylla.*

39. Prunus wallaceana Kalkm., *spec. nov.*

Type: *Kostermans 18587*, holotype in L, isotypes not seen, but present in several herbaria.

Rami primo (sparse) pubescentes mox glabrati. Folia elliptico-oblonga vel oblonga, interdum subovata, 10—17½ × 4—8 cm, adulta subglabra, rarius indumento subpersistente obtecta, nervis utrinque 8—14, glandibus basalibus vulgo 2, planis, interdum 1 vel 0; petiolus (½—)1—2½ cm longus. Racemi solitarii, axillares, (2—)4—10 cm, rachi pubescenti. Pedicelli (½—)3—6 mm. Hypanthium 2—3 mm altum. Perianthium dichlamydeum, 5(—6)-merum; sepala triangularia, 1—1½ mm longa; petala basin versus angustata, 1½—3 mm longa. Stamina 35—55. Pistillum glabrum. Drupa transverse ellipsoidea, 11—13 × 16½—18 mm; testa glabra.

Tree or treelet, up to 10(—30) m. *Twigs* pubescent when young, usually sparsely so and rapidly glabrescent. *Leaves* elliptic-oblong to oblong, sometimes somewhat ovatish, 10—17½ by 4—8 cm, index 2—2½, base rounded and usually decurrent, or acutish, apex tapering or subacuminate, herbaceous, (sub)glabrous when mature, more rarely with persistent pubescence; nerves 8—14 pairs, flat above, prominent beneath,

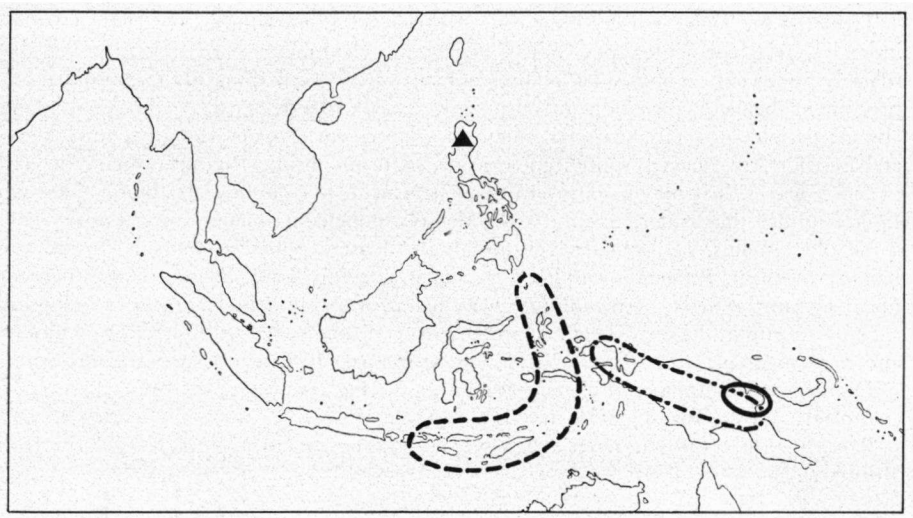

Fig. 31. Distribution of 38. *P. pullei* var. *pullei* (—.—.—) and var. *grandiflora* (————), 39. *P. wallaceana* (— — — —), 40. *P. subglabra* (▲).

venation visible but not conspicuous; basal glands usually 2, flat, sometimes 1 or 0, additional glands few or none; petiole (½—)1—2½ cm, (sparsely) pubescent when young, glabrescent. *Stipules* 3—9 by ¾—2¼ mm, index 2½—6, sometimes slightly keeled inside, but free, pubescent outside, sparsely so inside, marginal glands sometimes present. *Racemes* solitary, in axils of fallen or extant leaves, (2—)4—10 cm; peduncle less than ½ cm; rachis sparsely, rarely more densely, pubescent. *Bracts* caducous, *c.* 1½(—4) mm long, pubescent outside, usually glabrous inside, lower ones sometimes with tridentate apex. *Pedicels* (½—)3—6 mm, sparsely pubescent. *Hypanthium* 2—3 mm high, (sparsely) pubescent outside, on inside only hairs on bottom. *Perianth* biseriate, 5(—6)-merous; sepals triangular, 1—1½ mm long; petals with narrowed base, 1½—3 mm long. *Stamens* 35—55; filaments up to 4½ mm, glabrous or slightly hairy at base; anthers 0.3—0.7 mm long. *Ovary* glabrous except around insertion; style up to 6 mm. *Fruits* transversely ellipsoid, 11—13 by 16½—18 mm, *c.* 1.4—1.5 times as wide as long, glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. Lesser Sunda Is (Sumbawa, Sumba, Timor), Moluccas (Talaud, Ternate, Ceram). — Fig. 31.

Ecology. Primary forest, 0—800(—1700) m.

Compilation of field-notes. Buttresses once reported. Bark grey to brown, smooth, living bark 3—10 mm, blaze pale brown to dark brownred, smelling of bitter almonds. Wood pale brown. Flowers white or cream-coloured, fragrant. Fruits green when young, later red, bitter. *Vernaculars:* in Sumbawa Kostermans noted twice *Kemojang.*

Remarks. With the material at hand it is not possible to be certain that only one taxon is concerned here. Moluccan specimens in flower are not yet known.

Named after 'Wallacea', because of the distribution.

40. Prunus subglabra (Merr.) Kalkm., *comb. nov.* — *Pygeum subglabrum* Merr., Philip. J. Sc. 30 (1926) 395.

Type: *Ramos & Edaño BS 45014*, holotype in UC, no isotypes seen.

Treelet, 3 m. *Twigs* sparsely pubescent, glabrescent. *Leaves* elliptic, 6—8½ by 4—5 cm, index 1½—1¾, base acute, apex shortly and bluntly acuminate, hard and stiff when dry, sparsely pubescent on both sides, glabrescent; nerves 6—8 pairs, slightly impressed above, prominent beneath, venation inconspicuous; basal glands 2, flat, additional glands absent; petiole ½—¾ cm, sparsely pubescent, glabrescent. *Stipules c.* 8 by 4 mm, keeled at base, but free, sparsely pubescent outside, glabrous inside. *Racemes* solitary, in axils of fallen leaves, in fruit up to 2½ cm, stout; rachis densely pubescent. *Bracts* unknown. *Pedicels* under the fruit *c.* 2 mm, stout, densely pubescent. *Flowers* only known from some old remains. *Hypanthium c.* 3 mm high, densely pubescent outside, inside only hairs on bottom. *Perianth segments* ?9, subequal, *c.* 2 mm long. *Stamens c.* 45; filaments up to 3½ mm; anthers *c.* ½ mm long. *Ovary* hairy, probably densely so. *Fruits* ? ellipsoid, *c.* 15 by 12 mm in the only sheet examined, but according to Merrill's description globose and *c.* 2 cm diam., still sparsely hairy; endocarp sparsely hairy; seedcoat glabrous.

Distribution. Philippines (Luzon: Mt Pulog). — Fig. 31.

Ecology. Mossy forest, 2700 m.

Remarks. Only known from the type. Its affinities are not clear *(P. oocarpa* from Borneo?).

41. **Prunus polystachya** (Hook. *f.*) Kalkm., *comb. nov.* — *Pygeum polystachyum* Hook. *f.*, Fl. Brit. Ind. 2 (1878) 320; King, J. As. Soc. Beng. 66, 2 (1897) 290; Koehne, Bot. Jahrb. 51 (1913) 188; Ridl., Fl. Mal. Penins. 1 (1922) 674; Corner, Ways. Trees, 2nd ed. (1952) 528, fig. 182, pl. 166. — *Pygeum parviflorum* (*non* T. & B.) King var. *densum* King, J. As. Soc. Beng. 66, 2 (1897) 292, *pro parte, typo excl. ('densa').* — *Pygeum myriandrum* Merr., Pap. Mich. Acad. Sc. 19 (1934) 155.

Typification. *Pygeum polystachyum: Maingay 627*, holotype in K, isotypes seen from CAL, L.

Pygeum parviflorum var. *densum:* see under *Prunus arborea* var. *densa*, p. 100. The specimens *King's Coll. 10195* and *10396* belong to the present species.

Pygeum myriandrum: Bartlett 6871, holotype in US, isotypes seen from K, L.

Tree, up to 35 m. *Twigs* pubescent when young, glabrescent. *Leaves* elliptic to elliptic-ovate, 8—26 by 5—15 cm, index 1½—2½, base rounded to truncate, very rarely acute, apex obtuse to shortly acuminate, herbaceous, sometimes rather stiff when dry, (almost) glabrous above, lower surface finely pubescent but soon glabrous except on the main nerves, usually becoming distinctly dotted; nerves 9—12(—14) pairs, flat to slightly impressed above, prominent beneath, venation transverse, almost invisible above, rather indistinct beneath; basal glands (fig. 7 k) in most leaves 2, but often absent in the first leaves of a shoot, usually deeply hollowed, sometimes only shallowly so, sometimes not in the blade proper but in the contracted base, additional glands usually present and often rather numerous, much smaller, flat; petiole ½—1½ cm, pubescent, glabrescent. *Stipules* 4—10 by 1½—3 mm, index 2—5½, usually free, rarely shortly intrapetiolarly connate, pubescent outside, pubescent to glabrous inside, margin sometimes glandular, midrib usually oblique. *Racemes* (fig. 4) solitary, mostly at base of young shoots, the lower ones in axils of cataphylls (not seen), the higher-placed ones in axils of normal leaves, or racemes united into 'panicles' in the axils of leaf-scars, the 'panicles' being leafless shoots usually with terminal bud, rarely the racemes fascicled by contraction of the 'panicle'-rachis, very rarely the racemes compound (i.e. branched at base), racemes 3½—11 cm, in fruit slightly longer; peduncle up to 3 mm; rachis pubescent. *Bracts* caducous, *c.* 1½ mm long, hairy outside, glabrous inside. *Pedicels* 1—3 mm, rarely longer, pubescent. *Hypanthium* 2—3 mm high, densely pubescent outside, long-hairy on bottom

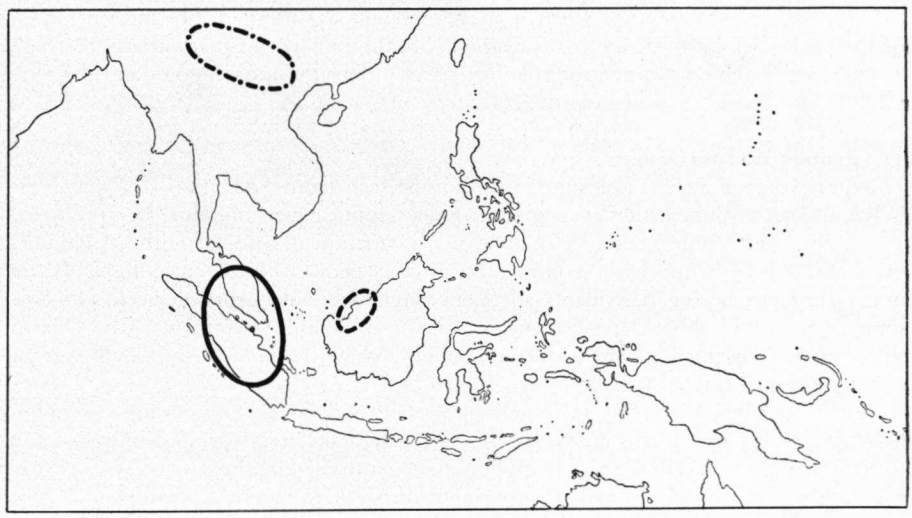

Fig. 32. Distribution of 41. *P. polystachya* (————), 42. *P. turfosa* (— — — —), 44. *P. lancilimba* (—.—.—)

inside. *Perianth segments* 7—11, subequal to inequal but usually not regularly divided into sepals and petals, *c.* 1 mm long, hairy. *Stamens* 50—85; filaments up to 5 mm, glabrous; anthers 0.3—0.7 mm long. *Ovary* with many long hairs on very base, higher up glabrous or with some few long hairs, rarely more densely hairy, even up to the 4—5 mm long style. *Fruits* transversely ellipsoid, 13—21 by 17—27 mm, 1.1—1.3 times as wide as long, glabrous; endocarp glabrous; seedcoat glabrous or more or less densely hairy.

Distribution. Sumatra (Eastcoast, Westcoast, Palembang), Malaya (Perak, Pahang, Selangor, Malacca, Johore), Singapore. — Fig. 32.

Ecology. Primary rainforest and secondary forest, 0—600 m.

Compilation of field-notes. Buttresses sometimes present. Bark light- to blackbrown, smooth, exuding gum. Wood brown, hard. Flowers: hypanthium lightgreen outside, yellow-green inside, perianth and filaments white, anthers lightbrown, style dirty white. Fruits (few data) dark yellow (not yet ripe). *Vernaculars:* in Malaya usually *Medang* (also applied to other species), in Sumatra *Tenangau* reported more than once.

Remarks. Corner, l.c., said about this species that in Singapore the leaves are shed twice a year (april-may and october-november), the new shoots developing when most of the old leaves have fallen. Flowering is often completed before the new leaves are full-grown. Pollination is effected by 'crowds of hover-flies and small beetles', attracted by the scent of the flowers. What Corner stated about most of the flowers being male, only a few of the latest developed having functional ovaries, is — judged by the herbarium material — not a common feature.

The species can hardly be confused with other ones, the large leaves with the usually large, distinctly hollowed glands are already characteristic, the large flowers with their many stamens, and the large fruits add to the distinctiveness. Variable characters are the pubescence of ovary and seedcoat.

Some specimens from Perak and Selangor are atypical in having only shallowly hollowed basal glands instead of deeply hollowed ones.

Some specimens from N. Borneo may represent a variety of the present species, or they may belong to *P. arborea* var. *densa*. See the remarks to that variety, p. 101.

The species plays an important rôle in understanding the morphology and the semophylesis of the inflorescence in subg. *Laurocerasus*, see p. 9.

42. Prunus turfosa Kalkm., *spec. nov.*

Type: *Anderson 13123*, holotype in L, isotype seen from SAR.

Rami sparse pubescentes vel glabri. Folia elliptica vel oblonga, 8—13(—18) × 4—6½ cm, sparse pubescentia vel glabra, nervis utrinque 8—12, glandibus basalibus 2, excavatis, ad foliorum basin contractum positis; petiolus ½—1 cm longus. Racemi in fasciculis ad 4 aggregati, axillares, ad 3½ cm longi, rachi pubescente. Pedicelli 1½—2 mm longi. Perianthii lobi 5—8, subaequales, ad 1 mm longi. Stamina 15—30. Ovarium sparse pubescens, raro glabrum? Drupa subglobosa, 7—9 × 8—9 mm, pilis nonnulis obtecta vel glabra; testa glabra.

Small tree, up to 12 m. *Twigs* sparsely pubescent to glabrous. *Leaves* elliptic to oblong, 8—13(—18) by 4—6½ cm, index (1½—)2—3, base acute, rarely rounded, apex obtuse to acuminate, herbaceous, sparsely pubescent to entirely glabrous; nerves 8—12 pairs, slightly impressed above, rather prominent beneath, venation inconspicuous; basal glands 2, deeply hollowed, situated in the contracted leaf-base, additional glands present, flat; petiole ½—1 cm, sparsely pubescent to glabrous. *Stipules* not seen in mature state. *Racemes* in bundles of up to 4, in axils of leaves or their scars, up to 3½ cm; peduncle less than ½ cm; rachis pubescent. *Bracts* up to 2 mm long, sparsely hairy outside, glabrous inside, basal ones sometimes tripartite. *Pedicels* 1½—2 mm, pubescent. *Hypanthium* 1¾—2½ mm high, sparsely hairy outside, entirely glabrous inside. *Perianth segments* 5—8, subequal, up to 1 mm long, but usually smaller, hairy. *Stamens* 15—30; filaments up to 3½ mm, glabrous or slightly hairy at base; anthers ¼—½ mm long. *Ovary* sparsely hairy (rarely entirely glabrous?); style up to 4½ mm, glabrous. *Fruits* subglobular, 7—9 by 8—9 mm, with some few hairs or glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. Borneo (Sarawak, ?Indon. Borneo, ?Brunei). — Fig. 32.

Ecology. Peat swamp forest, about sea-level.

Compilation of field-notes. All notes are taken from the collections of Anderson and Wood in Sarawak. Small buttresses rarely present. Bark grey, smooth or slightly rough, blaze lightbrown, strongly smelling. Wood pink, soft, exuding some white mucilage. Hypanthium pale yellow, sometimes filled with nectar, other flowerparts white. *Vernaculars:* Anderson noted *Akil* and *Enteli*.

Remarks. As far as known up till now, this species is restricted to the peat swamp forests in Borneo. It was several times collected by Anderson, who stated (on his specimen *12437)* that it is also frequent in Brunei from which country I did not see any specimens.

The species is most closely related to *P. arborea* var. *densa* from which it differs in the shape of the leaves and the number of nerves.

43. Prunus arborea (Bl.) Kalkm., *comb. nov.* — *Polydontia arborea* Bl., Bijdr. (1826) 1105; G. Don, Gard. Dict. 2 (1832) 516; Wight, Ill. Ind. Bot. 1 (1840) 203 *('Polyodontia')*. — *Pygeum parviflorum* T. & B., Nat. Tijd. N.I. 2 (1851) 309; T. & B., Ned. Kruidk. Arch. 3 (1855) 412; Miq., Fl. Ind. Bat. 1, 1 (1855) 361; C. Muell. *in* Walp., Ann. 4 (1857) 641; Hook. *f.*, Fl. Brit. Ind. 2 (1878) 320; King, J. As. Soc. Beng. 66, 2 (1897) 291, *pro parte, typo incl.*, *incl.* var. *densum* King, l.c., p. 292, *pro parte, typo incl. ('densa')*; K. & V., Bijdr. 5 (1900) 350, *incl.* var. (forma) *genuinum* K. & V., l.c., p. 351 *('genuina')*, var. *lanceolatum* K. & V., l.c., p. 352 *('lanceolata')*, var. *robustum* K. & V., l.c., p. 353 *('robusta')*, *et* var.

subcordatum K. & V., l.c., p. 353 *('subcordata');* Back., Schoolfl. Java (1911) 448; Koord., Exk. Fl. Java 2 (1912) 336; Koord., Atlas 1 (1913) pl. 112, 113; Koehne, Bot. Jahrb. 51 (1913) 199; Ridl., Fl. Mal. Penins. 1 (1922) 675; Ridl., Kew Bull. (1938) 282; Meeuse & Adelb. *in* Back., Bekn. Fl. Java (em. ed.) IV C 2 (1943) fam. 116, p. 23, *pro parte, syn. Pygeum latifolium excl.;* Corn., Ways. Trees (1952) 528. — *Pygeum arboreum* (Bl.) Endl. *ex* C. Muell. *in* Walp., Ann. 4 (1857) 642; Kurz, J. As. Soc. Beng. 45, 2 (1877) 303; Kurz, For. Fl. Brit. Burma 1 (1877) 435; Hook. *f.*, Fl. Brit. Ind. 2 (1878) 322; Koehne, Bot. Jahrb. 51 (1913) 183; Craib, Fl. Siam. Enum. 1 (1931) 566; Back. & Bakh. *f.*, Fl. Java 1 (1963) 520, *pro parte, syn. Pygeum latifolium excl.* — *Digaster sumatranus* Miq., Sum. (1861) 129, 330. — *Pygeum sumatranum* (Miq.) Miq., Sum. (1861) 619; Koehne, Bot. Jahrb. 51 (1913) 192. — *Pygeum blumei* T. & B., Cat. Hort. Bog. (1866) 252, *nom. superfl.;* Koehne, Bot. Jahrb. 51 (1913) 200, *incl.* var. *amplificatum* Koehne, l.c., p. 201. — *Pygeum persimile* Kurz, J. As. Soc. Beng. 41, 2 (1872) 306; Hook. *f.*, Fl. Brit. Ind. 2 (1878) 320; King, J. As. Soc. Beng. 66, 2 (1897) 291; Koehne, Bot. Jahrb. 51 (1913) 187; Ridl., Fl. Mal. Penins. 1 (1922) 675; Craib, Fl. Siam. Enum. 1 (1931) 568; *non* Kurz, J. As. Soc. Beng. 45, 2 (1877) 303, *quoad est P. grisea* var. *tomentosa.* — *Pygeum montanum* Hook. *f.*, Fl. Brit. Ind. 2 (1878) 321; Koehne, Bot. Jahrb. 51 (1913) 184. — *Pygeum capitellatum* Hook. *f.*, Fl. Brit. Ind. 2 (1878) 321; Koehne, Bot. Jahrb. 51 (1913) 185. — *Pygeum intermedium* King, J. As. Soc. Beng. 66, 2 (1897) 288; Koehne, Bot. Jahrb. 51 (1913) 187. — *Pygeum ovalifolium* King, J. As. Soc. Beng. 66, 2 (1897) 292; Koehne, Bot. Jahrb. 51 (1913) 188; Ridl., Fl. Mal. Penins. 1 (1922) 677. — *Pygeum stipulaceum* King, J. As. Soc. Beng. 66, 2 (1897) 287; Koehne, Bot. Jahrb. 51 (1913) 188; Ridl., Fl. Mal. Penins. 1 (1922) 673; Ridl., Kew Bull. (1938) 282. — *Pygeum henryi* Dunn, J. Linn. Soc. Bot. 35 (1903) 493; Koehne, Bot. Jahrb. 51 (1913) 185; Rehd. *in* Sarg., Pl. Wilson. 2 (1915) 344. — *Pygeum anomalum* Koehne, Bot. Jahrb. 51 (1913) 183. — *Pygeum ciliatum* Koehne, Bot. Jahrb. 51 (1913) 184. — *Pygeum floribundum* Koehne, Bot. Jahrb. 51 (1913) 190. — *Pygeum griffithii (non* Hook. *f.)* Koehne, Bot. Jahrb. 51 (1913) 189; Ridl., Fl. Mal. Penins. 1 (1922) 676. — *Pygeum junghuhnii* Koehne, Bot. Jahrb. 51 (1913) 193. — *Pygeum merrillianum* Koehne, Bot. Jahrb. 51 (1913) 206; Merr., Enum. Philip. 2 (1923) 233. — *Pygeum ocellatum* Koehne, Bot. Jahrb. 51 (1913) 184, *e descr.* — *Pygeum robustum* (K. & V.) Koehne, Bot. Jahrb. 51 (1913) 198. — *Pygeum sericeum* Koehne, Bot. Jahrb. 51 (1913) 188, *incl.* var. *denudatum* Koehne, l.c., p. 189. — *Pygeum subcordatum* (K. & V.) Koehne, Bot. Jahrb. 51 (1913) 199. — *Pygeum timorense* Koehne, Bot. Jahrb. 51 (1913) 202, *pro min. parte, typo excl.* — *Pygeum euphlebium* Merr., Philip. J. Sc. 10 (1915) Bot. 311. — *Pygeum diospyrophyllum* Koehne, Bot. Jahrb. 52 (1915) 343. — *Pygeum pilinospermum* Koehne, Bot. Jahrb. 52 (1915) 342. — *Pygeum wilsonii* Koehne, Bot. Jahrb. 52 (1915) 334. — *Pygeum patens* Ridl., J. Fed. Mal. St. Mus 6 (1915) 144; Ridl., Fl. Mal. Penins. 1 (1922) 676. — *Pygeum rubiginosum* Ridl., J. Fed. Mal. St. Mus. 6 (1915) 143, *nom. illeg., non* Elm. (1913); Ridl., Fl. Mal. Penins. 1 (1922) 677. — *Pygeum ellipticum* Merr., J. Str. Br. R. As. Soc. 76 (1917) 83, *e descr.;* Merr., Enum. Born. (1921) 289. — *Pygeum pachyphyllum* Merr., J. Str. Br. R. As. Soc. 76 (1917) 82; Merr., Enum. Born. (1921) 289. — *Pygeum parreauanum* Pierre *ex* Card., Not. Syst. 3 (1918) 381; Pierre *in* Lanessan, Pl. Util. Col. Franç. (1886) 284, *nomen ('Pigeum parreavii');* Card. *in* Fl. Gén. I.C. 2 (1920) 620, fig. 58. — *Pygeum sessiliflorum* Card., Not. Syst. 3 (1918) 381; Card. *in* Fl. Gén. I.C. 2 (1920) 618, fig. 58. — *Pygeum topengii* Merr., Philip. J. Sc. 15 (1920) 237. — *Pygeum ferreum* Craib, Kew Bull. (1929) 106; Craib, Fl. Siam. Enum. 1 (1931) 566. — *Pygeum tokangpengii* Merr., Lingn. Un. Sc. Bull. 2 (1930) 54, *non vidi, prob. nom. superfl.* — *Pygeum affine* Merr., J. Arn. Arb. 23 (1942) 168. — *Pygeum brachybotrys* Merr., J. Arn. Arb. 23 (1942) 169. — *Pygeum laxiflorum* Merr. *(in herb.) ex* Li, J. Arn. Arb. 26 (1945)

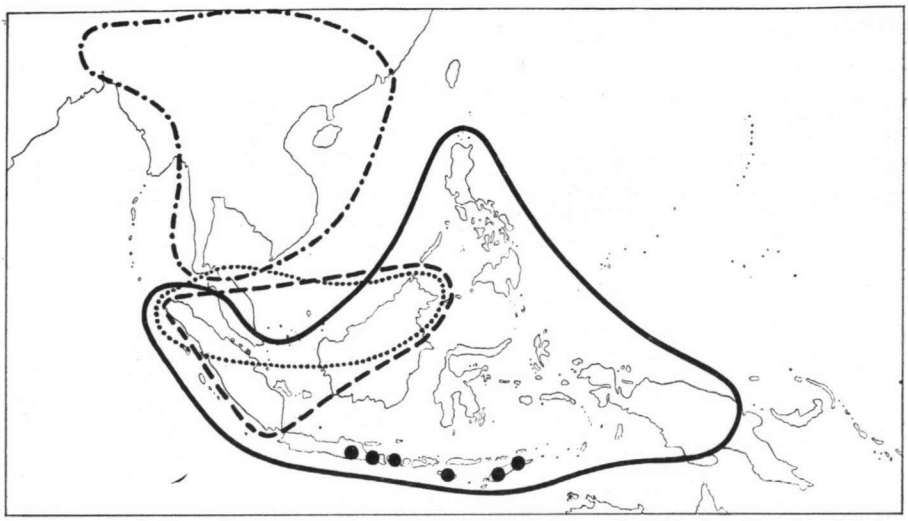

Fig. 33. Distribution of 43. *P. arborea* var. *arborea* (————), var. *robusta* (●), var. *stipulacea* (— — — —), var. *montana* (—.—.—), var. *densa* (. . . . . .).

64. — *Pygeum atrovillosum* Vidal, Not. Syst. 13 (1948) 297. — *Pygeum bachmaense* Vidal, Not. Syst. 13 (1948) 296. — *Pygeum donaiense* Vidal, Not. Syst. 13 (1948) 296, *incl.* var. *crassistylum* Vidal, l.c., p. 296.

Tree, up to 35 m, sometimes (var. *densa*, var. *stipulacea)* a shrub. *Twigs* more or less densely pubescent, more or less completely glabrescent. *Leaves* elliptic to oblong or ovate to lanceolate, 3—25 by 1½—13 cm, base acute to subcordate, apex acute to acuminate, sparsely to densely pubescent when young, indumentum rapidly disappearing or still present when mature, herbaceous to coriaceous; nerves 5—14(—16) pairs, flat to slightly impressed above, usually prominent beneath, venation not very conspicuous (but rather prominent beneath in var. *stipulacea)*; basal glands usually 2, flat or (var. *montana*, var. *densa)* slightly to distinctly hollowed, in var. *robusta* always absent, additional glands present or not; petiole (¼—)½—1½(—2) cm, pubescence as in the twigs. *Stipules* 1½—12½ by 1—7(—10) mm, index 1—6, pubescent outside and (in var. *robusta*, var. *densa* and var. *stipulacea)* sometimes with 1 to several flat or crateriform glands, sparsely hairy to glabrous inside, margin usually glandular in var. *montana*, usually caducous but in var. *stipulacea* sometimes rather persistent. *Racemes* in fascicles of 2—6, sometimes mixed with solitary ones, fascicles sometimes with terminal bud, in var. *robusta* and var. *montana* the racemes sometimes compound and branched from the base, placed in axils of (extant or) fallen leaves, ½—6(—9) cm; peduncle rarely longer than ½ cm; rachis (densely) pubescent. *Bracts* up to 3 mm long, pubescent outside, usually glabrous inside, caducous, those at the base sometimes with tridentate apex. *Pedicels* 0—6 mm, pubescent. *Hypanthium* 1—3 mm high, pubescent outside, on inside usually with hairs on bottom. *Perianth segments* 5—11, usually subequal, sometimes partly sepal-like and partly petal-like, in var. *montana* sometimes regularly divided into two more or less distinct whorls, ½—1 mm long, rarely slightly longer, hairy. *Stamens* 10—50; filaments up to 7 mm, usually hairy at base; anthers ¼—1 mm long. *Ovary* densely hairy, as is the base of the up to 5½ mm long style, in var. *montana* ovary sometimes (sub)glabrous.

Fruits globular to transversely ellipsoid or didymous, 5—11½ by 7—17 mm, more or less hairy still; endocarp glabrous or hairy; seedcoat hairy or glabrous.

Distribution. Continental Asia from Sikkim eastward and southward, throughout Malesia. — Fig. 33.

Remarks. This is a variable species, as may be suspected from the respectable list of synonyms. It has been divided into five varieties; the reasons for not keeping them as separate species are given in the remarks to the varieties.

KEY TO THE VARIETIES

1. Ovary glabrous or with some few hairs only. . . . . **d.** var. **montana**
1. Ovary distinctly and densely hairy.
   2. Seedcoat glabrous.
      3. Nerves 5—9 pairs. Racemes ½—1½ cm long, rarely longer. . . . . **e.** var. **densa**
      3. Nerves 8—16 pairs. Racemes 1½—8 cm long.
         4. Stipules often more than 4 mm wide, not more than twice as long as wide, sometimes with flat or crateriform glands outside, sometimes persistent. . . . . **c.** var. **stipulacea**
         4. Stipules never more than 4 mm wide, usually more than twice as long as wide, never with glands on outer surface, but often with a glandular margin, caducous . **d.** var. **montana**
   2. Seedcoat hairy.
      5. Mature leaves still distinctly hairy beneath. . . . . **c.** var. **stipulacea**
      5. Mature leaves glabrous or only some hairs left on the main nerves.
         6. Fruits 5—10½ by 7½—13½ mm. Flowers rather small, hypanthium 1—2 mm high, stamens 12—30(—40). . . . . **a.** var. **arborea**
         6. Fruits 9—11½ by 13½—17 mm. Flowers larger, hypanthium 2—3 mm high, stamens 30—50. **b.** var. **robusta**

a. var. **arborea**

Polydontia arborea Bl. — *Pygeum parviflorum* T. & B., *incl.* var. *genuinum* K. & V. *et* var. *lanceolatum* K. & V., *excl.* var. *densum* King — *Pygeum arboreum* (Bl.) C. Muell., *non auct. alior.* — *Digaster sumatranus* Miq. — *Pygeum sumatranum* (Miq.) Miq. — *Pygeum blumei* T. & B., *incl.* var. *amplificatum* Koehne — *Pygeum persimile* Kurz — *Pygeum intermedium* King — *Pygeum floribundum* Koehne — *Pygeum griffithii* (*non* Hook. *f.*) Koehne — *Pygeum junghuhnii* Koehne — *Pygeum merrillianum* Koehne — *Pygeum sericeum* Koehne var. *denudatum* Koehne, *p.p, typo incl.* — *Pygeum subcordatum* Koehne, *p.p., typo excl.* — *Pygeum euphlebium* Merr. — *Pygeum diospyrophyllum* Koehne — *Pygeum pilinospermum* Koehne. — For complete references see under the species. — **Fig. 34.**

Typification. *Polydontia arborea, Pygeum arboreum,* and *Pygeum blumei:* Cited as '*Kitumbilah*' from W. Java. This must be: *Blume 654,* holotype in L (sheet nr. 908.196-179), isotypes probably also in BO.

Pygeum parviflorum: Cited as '*Kawojang*' from Hortus Bogoriensis. This must be: *Teysmann & Binnendijk s.n.,* holotype in L (sheet nr. 908.196-192).

Digaster sumatranus and *Pygeum sumatranum:* lectotype: *Teysmann HB 3968,* holotype in U, isotypes seen from A, BO, CAL, L; syntype: *Junghuhn s.n.* (L, sheet nr. 908.191-907).

Pygeum persimile: Griffith s.n., holotype in CAL (sheet nr. 144753), isotypes seen from BM, BO, L. In his 1872 paper, Kurz did not mention a specimen, only 'Tenasserim'. In J. As. Soc. Beng. 45,2 (1877) 303 he cited *Helfer 2056.* King (1897) stated that this specimen was wrongly and inadvertently brought to *persimile* by its own author. It is impossible indeed to consider *Helfer 2056* as the type specimen of *Pygeum persimile* (1872), because of two important deviations from the description: the specimen has a glabrous ovary (the description says: ovary densely tawny hirsute) and solitary inflorescences (in descr.: usually by 2—3). As King rightly said, the description of 1872 agrees

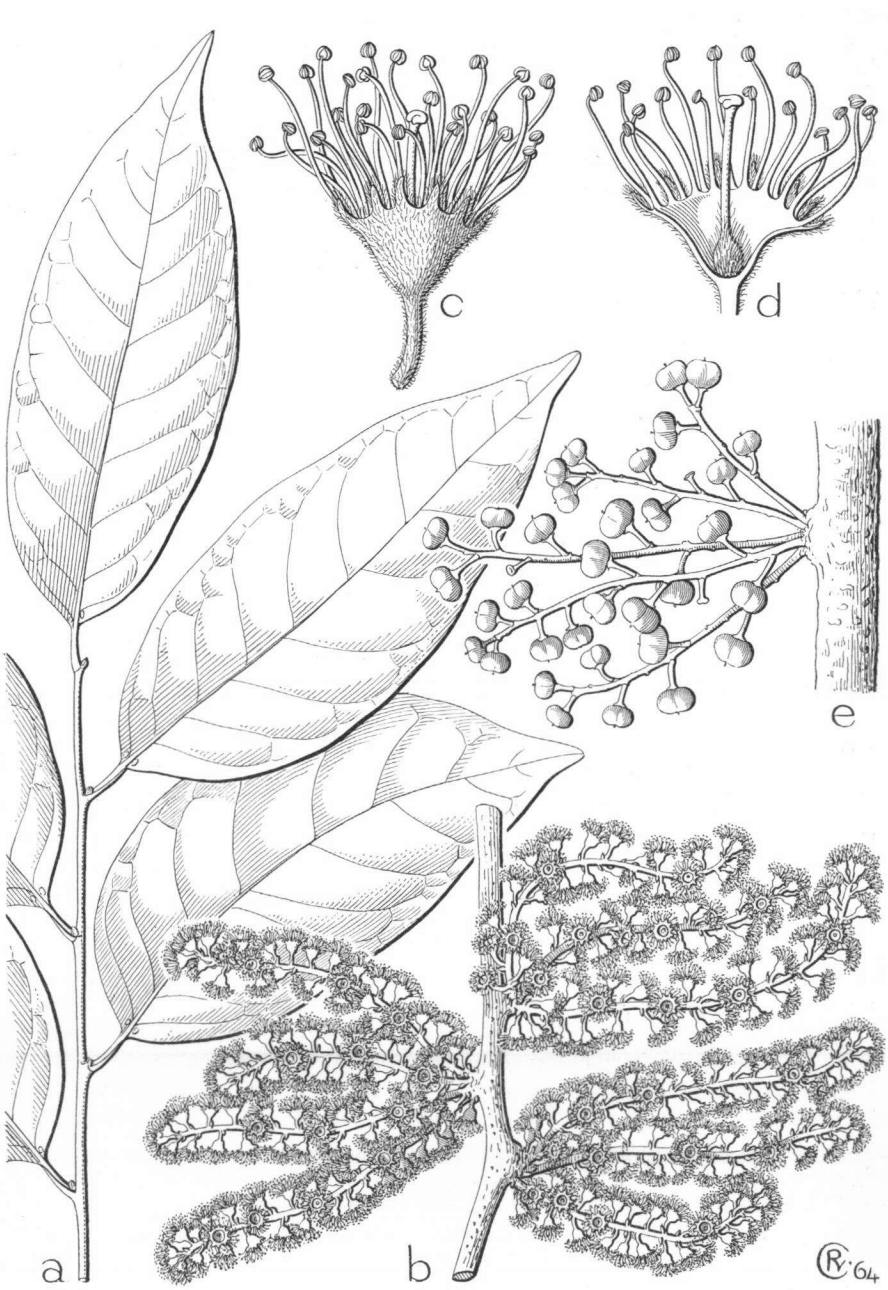

Fig. 34. *Prunus arborea* var. *arborea*. — a. twig with leaves (× $\frac{2}{3}$); b. fascicled racemes (× $\frac{2}{3}$); c. flower, and d. halved flower (× 4); e. infructescences (× $\frac{2}{3}$). (a. from *De Monchy 1*; b, c, d. from *Koorders 6389β*; e. from *Goodenough & Ridley 1561*).

fully with *Griffith s.n.* from Malacca, and most likely is that Kurz mixed up the two specimens, after 1872 perceived his error, but failed to revise his description for his 1877 paper. *Pygeum persimile* Kurz (1877), typified by the truly Burmese specimen *Helfer 2056*, is *Prunus grisea* var. *tomentosa*.

Pygeum intermedium: lectotype: *King's coll. 3791*, holotype in CAL, isotypes seen from BM, K, SING; syntype: *Maingay 626* (A, BM, CAL, K, L).

Pygeum floribundum: Maingay 626, holotype in L, see above.

Pygeum griffithii: see under Dubious Species, p. 106.

Pygeum junghuhnii: Junghuhn s.n., holotype in L (sheet nr. 908.191-907), no isotypes seen.

Pygeum merrillianum: lectotype: *Merritt FB 6784*, holotype in B? (lost), lectotype in US, no further isotypes seen; syntype: *Merritt FB 6854* (US). Koehne cited the collector incorrectly as Merrill, hence also the epithet.

Pygeum sericeum var. *denudatum:* lectotype: *Beccari 358*, holotype in L, isotype seen from BM; syntype: *Herb. Billiton 65* (L), almost sterile; the other syntypes cited belong to var. *densa*.

Pygeum subcordatum: see under var. *robusta*.

Pygeum euphlebium: Miranda FB 20619, holotype in PNH (lost), lectotype in US, no further isotypes seen.

Pygeum diospyrophyllum: Ledermann 9569, holotype in B (lost), lectotype in L, isotype seen from K.

Pygeum pilinospermum: lectotype: *Ledermann 6718*, holotype in B (lost), lectotype in K, isotypes seen from E, SING; syntype: *Ledermann 7762* (K).

Tree up to 35 m. *Twigs* pubescent when young, soon glabrous. *Leaves* oblong to ovate, in the Javanese mountain-forms sometimes ovate to lanceolate, 6—21 by 2½—8½(—10) cm, index 1¾—3(—3½), pubescent when young, but early glabrescent; nerves 7—12 pairs; basal glands usually 2, flat, sometimes only 1 or 0; petiole up to 1 cm. *Stipules* 1½—6(—8) by 1—4 mm, index 1—2(—4). *Racemes* in bundles of usually 2—5. *Pedicels* 1—3(—6) mm. *Hypanthium* 1—2 mm high. *Perianth segments* 6—11, small, usually subequal, only rarely more or less regularly divided into sepals and petals, but the 2 whorls never very different (fig. 1 g, h). *Ovary* densely hairy. *Fruits* transversely ellipsoid to didymous, 5—10½ by 7½—13½ mm; seedcoat densely hairy, rarely more sparsely so.

Distribution. Throughout Malesia: Sumatra (Eastc., Tapanuli, Westc., Palembang), also Simalur I. and Enggano I., Banka, Billiton, Malaya (Perak, Selangor, Negri Sembilan, Malacca), Singapore, Java, Lesser Sunda Is (Bali, Sumbawa, sterile specimens also from Sumba, Flores and Timor), Borneo (Sabah, Sarawak, Indon. E. & SE. Borneo), Philippines (Luzon, Mindoro, Mindanao), Celebes (Centr. part: Lake Lindu, Malili), Moluccas (Morotai, Batjan, Buru, Ceram, Ambon, Nusa Laut, Aru Is), New Guinea (Western part: Vogelkop Penins., Merauke Distr., also Japen I.; Eastern part: Sepik Region, Middle Fly R.). — Fig. 33.

Ecology. Primary (and secondary?) forest, 0—1800 m.

Compilation of field-notes. Bark brown, sometimes reported as greyish, usually smooth and not or hardly peeling, living bark (4—)8—15 mm, blaze more or less darkly red to brown, tasting bitter, smelling strongly of bitter almonds. Sapwood dirty white to pinkish, darkening after exposure, heartwood — if developed — darkbrown or darkred. Flower white, hypanthium orange-hairy, anthers orange, once said to produce 'a lot of honey', according to some collectors fragrant, according to others scentless. Fruits becoming black when ripe, *via* yellow, white, and red, tasting bitter. *Vernaculars:* In Malaya and Sumatra *Medang* with different suffixes several times reported (Malay lang.), in Java

the names *Huru* with suffix and *Kawojang* are also reported for this species (cf. *P. grisea* var. *grisea*), in Sumatra also *T(j)enangau* reported with or without suffix. *Uses:* several collectors mention the timber as well-suited for house-building purposes, once (Malaya) the bark is said to be used for walls of native houses.

Remarks. In its large area this variety is of course not entirely uniform, but it is impossible to keep separated the several local species proposed by Koehne. The most obvious variation is found in the dimensions of the fruits: in the eastern part of the area these are averagely larger than in the western part, see the graph, fig. 35.

Meeuse & Adelbert (1943) united the two species, which were correctly recognized in earlier works on the Java flora: '*Pygeum latifolium*' (now *P. grisea*) and '*Pygeum parviflorum*' (now *P. arborea* var. *arborea* and *robusta*). Being deceived by the fact that the indumentum of the ovary does not constitute a sharp difference between the two species, they overlooked the constant differences in inflorescence and seedcoat.

The specimens from the Philippines (only 5 seen, among which the types of *Pygeum merrillianum* and *Pygeum euphlebium*) have the leaves more densely hairy than is usual, and appear to be more or less transitional to var. *stipulacea.*

Pygeum polyadenium Koehne might be another synonym, see p. 106.

b. var. **robusta** (K. & V.) Kalkm., *comb. nov.*

Pygeum parviflorum T. & B. var. *robustum* K. & V. — *Pygeum parviflorum* T. & B. var. *subcordatum* K. & V. — *Pygeum robustum* (K. & V.) Koehne — *Pygeum subcordatum* (K. & V.) Koehne, *pro parte, typo incl.* — *Pygeum timorense* Koehne, *pro min. parte, typo excl.* — For complete references see under the species.

Typification. *Pygeum parviflorum* var. *robustum*, and *Pygeum robustum:* lectotype: *Koorders 23039β*, holotype in BO, isotype seen from L; syntypes: *Koorders 6466β* (BO, CAL, L), *21598β* (BO, CAL, L).

Pygeum parviflorum var. *subcordatum*, and *Pygeum subcordatum: Koorders 21704β*, holotype in BO, isotypes seen from CAL, L; syntype from same tree: *Koorders 20941β* (BO). Koehne cited under *P. subcordatum* also *Koorders 6389β* and *12301β*, which are var. *arborea.*

Pygeum timorense: The type specimen belongs to *Pr. grisea* var. *grisea*, see there.

Tree up to 32 m. *Twigs* pubescent when young, soon glabrous. *Leaves* ovate or ovate-lanceolate, 10—19 by 4—7(—10) cm, index 1½—3, pubescent when young, but early glabrescent; nerves 6—10 pairs; basal glands absent, but some inconspicuous, flat glands near margin sometimes present; petiole ¾—1¼ cm. *Stipules* 3½—6 by 1½—3(—6) mm, index 1½—4, with 1—4, often inconspicuous, flat glands on outer surface. *Racemes* sometimes compound (branched from the base), usually in bundles, mixed with solitary ones. *Pedicels* 2—6 mm. *Hypanthium* 2—3 mm high. *Perianth segments* 6—10, subequal. *Ovary* densely hairy. *Fruits* transversely ellipsoid to didymous, 9—11½ bij 13½—17 mm; seedcoat hairy.

Distribution: Java (East Java only, seen from Mt Idjen, Tjuramanis, and Mt Wilis), Lesser Sunda Is (Bali, Flores, Timor). — Fig. 33.

Ecology. Forest, as far as noted by the collectors, in periodically dry or very dry regions, *c.* 800—1800 m.

Compilation of field-notes. Only one note on bark (*Kostermans 154*): brown, smooth, living bark ½ cm, blaze reddish brown. Two notes on flowers: 'white, fragrant', resp. 'yellow, foetid'! Fruits green turning yellowish and red, finally becoming black. *Uses: Kostermans 154* said that in Bali the species is cultivated for reforestation.

Remarks. Differs from the type variety mainly in the larger flowers and fruits, but the

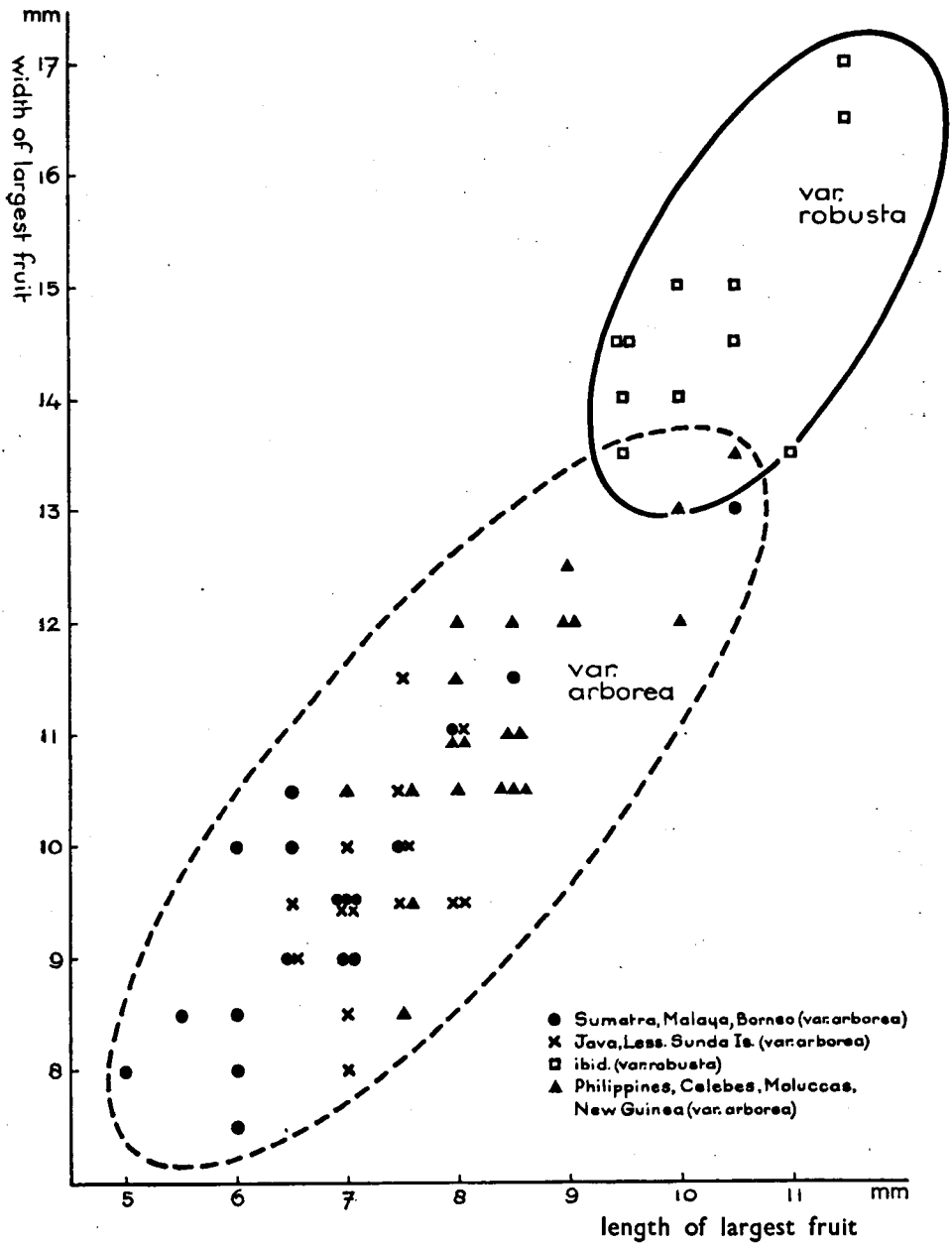

Fig. 35. Fruits of *P. arborea* var. *arborea* and var. *robusta*, scatter-diagram. Each dot represents a specimen with mature fruits, the largest fruit on the specimen being measured.

latter are very close to the largest fruits of var. *arborea* (from New Guinea and the Philippines). See fig. 35.

c. var. stipulacea (King) Kalkm., *stat. nov.*

Pygeum stipulaceum King — *Pygeum ellipticum* Merr., *e descr.* — *Pygeum pachyphyllum* Merr. — For complete references see under the species.

Typification. *Pygeum stipulaceum: King's coll. 11020*, holotype in K, isotype seen from CAL. King cited the specimen erroneously as *Scortechini 11020*.

Pygeum pachyphyllum: Clemens 11200, holotype in A, isotypes seen from BO, US.

Pygeum ellipticum: Jee Koo s.n. from Mt Poë, Sarawak, *non vidi*, could not be located in SAR.

Tree, rarely more than 20 m, sometimes shrubby? *Twigs* densely pubescent, glabrescent. *Leaves* elliptic to oblong, sometimes more ovatish, 6—25 by 3—13 cm, index 1½—2½(—3), densely pubescent when young, lower surface remaining pubescent also when mature; nerves 8—14(—16) pairs; basal glands 2, flat, or none; petiole ½—1½(—2) cm. *Stipules* 4—8(—11) by 2½—7(—10) mm, index 1—2(—4), sometimes with some flat to crateriform glands on outer surface, sometimes more or less persistent. *Racemes* in bundles of 2—6, rarely mixed with solitary ones. *Pedicels* 0—1½(—3) mm. *Hypanthium* 1—2½ mm high. *Perianth segments* 6—8(—10), subequal or (very rarely) more or less regularly divided into sepals and petals, but the 2 whorls never very different. *Ovary* densely hairy. *Fruits* didymous to transversely ellipsoid, 6—9(—10½) by 7½—11½(—14) mm; seedcoat densely hairy or more sparsely so, sometimes entirely glabrous.

Distribution. Sumatra (Atjeh, Westc., Palembang), Banka, Malaya (Kedah, Perak, Pahang, Johore), Singapore, Borneo (Sabah, Brunei, Sarawak, Centr. Indon. Borneo). Also in Vietnam? (cf. *Remarks*). — Fig. 33.

Ecology. Primary and secondary forest, also in mossy forest and subalpine scrub, 0—3200 m (cf. *Remarks*).

Compilation of field-notes. Bark brown, smooth, with distinct lenticels, living bark 4—5 mm, blaze red to brown, smelling, exuding gum. Wood light-coloured (few data). Flowers white to cream-coloured with brown indumentum. Fruits green when young, turning white to cream, red, ultimately almost black. *Vernaculars: Mentjelangai* or *Mentjelangan* 3 times reported from Banka, *Merubik* twice from Sarawak.

Remarks. There is a remarkable gap in the (very large) altitudinal range: most of the material is from 0—1500 m, the remainder comes from 2400—3200 m (Atjeh and Mt Kinabalu). The lowland- and the mountain-forms, however, cannot be separated on morphological characters and consequently no taxonomical status has been attributed to them. The mountain-plants have averagely smaller leaves, but there is a considerable overlap. Other characters could be used for distinguishing the Atjeh specimens from higher altitude (these have more stamens and more nerves than the lowland form), but those differences do not hold for the Kinabalu population.

It is mainly the indumentum of twigs and leaves which is responsible for the striking differences in outward appearance between most specimens of the varieties *stipulacea* and *arborea*. Other characters (e.g. the stipules) are either not correlated with the indumentum, or show a big overlap. And even the indumentum seems not to furnish a 100 % clear distinction, cf. the remarks on the Philippine specimens under var. *arborea*.

The seedcoat is usually densely hairy in the present variety, as it is in the related var. *arborea*. But some specimens (not geographically, nor altitudinally restricted) have seeds with only a few hairs, and there are some with entirely glabrous seeds too. This links

the variety with var. *montana* in which the reverse condition is found (seeds usually glabrous, sometimes hairy).

From S. Vietnam I saw two fruiting specimens (*Poilane 31046* and *Schmid s.n.*), which possibly are to be considered a form of var. *stipulacea*. They differ in having larger fruits (up to 15 mm long) with a thick endocarp. The status of this form cannot yet be decided upon.

d. var. **montana** (Hook. *f.*) Kalkm., *stat. nov.*

Pygeum arboreum (*non* C. Muell.) auct. alior. — *Pygeum montanum* Hook. *f.* — *Pygeum capitellatum* Hook. *f.* — *Pygeum henryi* Dunn — *Pygeum anomalum* Koehne — *Pygeum ciliatum* Koehne — *Pygeum ocellatum* Koehne — *Pygeum wilsonii* Koehne — *Pygeum parreauanum* Card. — *Pygeum sessiliflorum* Card. — *Pygeum topengii* Merr. — *Pygeum ferreum* Craib — *Pygeum tokangpengii* Merr. — *Pygeum affine* Merr. — *Pygeum brachybotrys* Merr. — *Pygeum laxiflorum* Li — *Pygeum atrovillosum* Vidal — *Pygeum bachmaense* Vidal — *Pygeum donaiense* Vidal, *incl.* var. *crassistylum* Vidal — For complete references see under the species.

Typification. *Pygeum montanum:* lectotype: *Griffith 2054* from Darjeeling, holotype in K, isotypes not seen. Another specimen under this number is from Khasia. Syntype: *Gomez (s.n.?)* from Khasia, *non vidi.*

Pygeum capitellatum: Helfer 2053, holotype in K, isotypes seen from A, CAL, L.

Pygeum henryi: lectotype: *Henry 12313A*, holotype in K, isotypes seen from A, E, US; syntypes: *Henry 12313* (E, K), *12313B* (A, E), *12708* (E, US).

Pygeum anomalum: Manson 12, holotype in L, isotypes seen from BM, BO, BR, CAL, K. Partly mixed with *Prunus ceylanica.*

Pygeum ciliatum: lectotype: *Prain's coll. 282*, holotype in CAL, isotype seen from BM; syntype: *Prain's coll. s.n.* (CAL).

Pygeum ocellatum: Koehne cited '*J. D. Hooker in Herb. Hook. f. et Thomson*' from 'Assam, Khasia, reg. temp. 4—5000 ped.' *Non vidi.*

Pygeum wilsonii: Wilson 4858, holotype in A, isotype seen from BM.

Pygeum parreauanum: Pierre 1422, holotype in P, isotypes seen from A, BM, BO, E, K.

Pygeum sessiliflorum: Pierre 687, holotype in P, isotypes seen from A, BM, BO, E, K, SING, US.

Pygeum topengii and (probably) *P. tokangpengii: To Kang Péng & Fuson 2750*, holotype in A, isotypes seen from K, US.

Pygeum ferreum: Kerr 15501, holotype in K, isotype seen from E.

Pygeum affine: Pételot 6160, holotype in A, no isotypes seen; paratype: *Pételot 6161* (A).

Pygeum brachybotrys: Pételot 4029, holotype in A, no isotypes seen.

Pygeum laxiflorum: Tsang 24375, holotype in A, no isotypes seen; paratypes: *Liang 69816* (A), *Tsang 26891* (A, P), *27088* (A), *27221* (P).

Pygeum atrovillosum: Chevalier 31264, holotype in P, no isotypes seen.

Pygeum bachmaense: Vidal 26, holotype in P, no isotypes seen.

Pygeum donaiense: Poilane 21217 (in Vidal, l.c., by mistake as *21127*), holotype in P, no isotypes seen.

Pygeum donaiense var. *crassistylum: Poilane 28086*, holotype in P, no isotypes seen.

Tree, up to 25 m. *Twigs* pubescent to densely pubescent, glabrescent. *Leaves* ovate to ovate-lanceolate or elliptic to oblong, 6—20(—23) by 2—7(—9) cm, index 2—4, (densely) pubescent when young, lower surface usually retaining its indumentum when mature; nerves (5—)7—12 pairs; basal glands usually 2, flat or slightly to distinctly hollowed; petiole (¼—)½—1(—1½) cm. *Stipules* 3—12½ by ¾—4 mm, index (1½—)2—6. *Racemes*

in bundles of 2—6, sometimes mixed with solitary ones, sometimes compound and forming a distinct panicle, (1½—)2—5(—8) cm. *Pedicels* 0—2(—3½) mm. *Hypanthium* 1½—3 mm high. *Perianth segments* 7—11, subequal, or sepals and petals more or less distinct from one another, although the petals only slightly longer. *Ovary* usually densely hairy, sometimes glabrous or almost so. *Fruits* globular to distinctly didymous, 6—10 by 7—15 mm; seedcoat glabrous, more rarely hairy.

Distribution. N.E. India (Sikkim, W. Bengal, Assam), Bhutan, E. Pakistan (Sylhet), S. China (Szechwan, Kweichow, Yunnan, Kwangsi, Kwangtung, Hongkong, Hainan), Burma (Upper Burma and Peninsula), Thailand (Chiang Mai and Peninsula), Laos, Cambodia, N. and S. Vietnam. — Fig. 33.

Ecology. Evergreen forest and thickets, 0—2000 m, especially between 900 and 1500 m.

Compilation of field-notes. Bark grey or brown, living bark 4—6 mm, blaze red to purple. Wood reddish (few data). Flowers white, fragrant? Fruits black when ripe (via yellow and red), smelling of bitter almonds. *Uses:* some few collectors mention local use of the timber.

Remarks. This variety is chiefly composed of what is most often identified as '*Pygeum arboreum* Kurz', but this has been augmented with a number of species based on minor differences *i.a.* in shape and indumentum of the leaves.

Since the hairiness of the seedcoat is in almost all species of the subgenus a constant character, I have only reluctantly united in this variety specimens with hairy and glabrous seeds. A hairy seedcoat is found in '*Pygeum topengii*', but otherwise entirely identical specimens of '*Pygeum laxiflorum*' have the normal, glabrous seeds.

The variety is closely related to var. *stipulacea*; the main, and admittedly not entirely sharp, difference is found in the shape, dimensions, and persistence of the stipules. In their seedcoats the two varieties differ also, but not consistently: hairy (but sometimes glabrous) in var. *stipulacea*, glabrous (but sometimes hairy) in var. *montana*.

There is also a narrow relationship to var. *densa*, but typical *montana* is easily recognized by its larger number of nerves and its longer racemes.

e. var. **densa** (King) Kalkm., *comb. nov.*

Pygeum parviflorum T. & B. var. *densum* King — *Pygeum ovalifolium* King — *Pygeum sericeum* Koehne, *incl.* var. *denudatum* Koehne, *pro parte, typo excl.* — *Pygeum patens* Ridl. — *Pygeum rubiginosum* Ridl. — *Pygeum griffithii* (*non* Hook. *f.*) Ridl. — For complete references see under the species.

Typification. *Pygeum parviflorum* var. *densum:* lectotype: *King's coll. 10753*, holotype in L, isotypes seen from BM, CAL, DD, K, US; syntype: *King's coll. 6986* (BO, CAL, E, P, SING). The two other specimens cited by King, are *Prunus polystachya*.

Pygeum ovalifolium: King's coll. 7329, holotype in CAL, isotypes seen from BM, K.

Pygeum sericeum: lectotype: *King's coll. 10753*, holotype in L, isotypes seen from BM, CAL, DD, K, US; syntype: *King's coll. 10827* (BM, CAL, DD, L, SING).

Pygeum sericeum var. *denudatum:* of the specimens, cited by Koehne, *Scortechini 330* and *330b* are the present variety, the lectotype belongs to var. *arborea* (see there).

Pygeum patens: type specimen not cited by Ridley; seen from type locality (G. Tahan) and chosen as lectotype: *Ridley 16057*, holotype in K, sterile isotype seen from SING.

Pygeum rubiginosum: syntypes: *Ridley 16043* (K, SING) and *16262* (BM, SING).

Pygeum griffithii: see under Dubious Specues, p. 106.

Tree, up to 26 m, or shrub. *Twigs* densely pubescent, glabrescent. *Leaves* ovate or elliptic to elliptic-oblong, 3—15 by 1½—8(—9) cm, index 1½—2½, densely pubescent when young, usually still hairy beneath when mature; nerves 5—9 pairs; basal glands usually

2, flat or (in part of Sumatran and Bornean specimens) distinctly hollowed and situated in the contracted leaf-base; petiole ¼—2 cm. *Stipules* 1½—6 by 1—4 mm, index 1½—5, outer surface sometimes with one or some crateriform glands (fig. 8a, b). *Racemes* in bundles of 2—3(—4), usually mixed with solitary ones, ½—1½(—4) cm. *Pedicels* 0—1½ mm, rarely longer. *Hypanthium* 1½—2½ mm high. *Perianth segments* 5—11, usually subequal to equal. *Ovary* densely hairy. *Fruits* transversely ellipsoid, 6—8½ by 8—11½ mm; seedcoat glabrous.

Distribution. Peninsular Thailand, Sumatra (Eastc.), Malaya (Kedah, Perak, Pahang, Selangor, Johore), incl. Penang I. and Tioman I., Borneo (Sabah, Sarawak, Indon. Borneo.) — Fig. 33.

Ecology. Lowland and montane forest, (150—)500—2000 m.

Compilation of field-notes. Hardly any notes on bark and wood. Flowers noted as yellowish or brownish. Fruits reported as green, cream, white, or red, probably becoming purplish black as is usual.

Remarks. The Malayan specimens (and the one specimen seen from Thailand) always have flat basal glands or none at all, but in part of the Bornean specimens (and in the only two Sumatran specimens seen) the glands are deeply hollowed and situated in the contracted leaf-base. The specimens with the hollowed glands, however, cannot be recognized as a separate taxon, because in all other characters they agree with those having flat glands. The same shape and position of the basal glands is also found in *P. polystachya* and in *P. turfosa*, both narrowly related to the present variety.

Specimens from 1500 m altitude or higher have smaller leaves and shorter petioles than those from lower altitudes, but in view of the overlap the two forms are probably better not formally recognized.

From Sabah I saw two specimens (*Puasa-Angian 3922* and *Mikil San 31863*) which more or less agree with the present variety, but differ in having distinct panicles with several lateral racemes in the basal centimetre. The specimens could also represent an undescribed variety of *P. polystachya*, from which they differ in the smaller dimensions of leaves and flowers. Fruits being still unknown, the position remains uncertain.

Within *P. arborea*, the present variety is most closely related to var. *montana*, see there.

Pygeum sterrophyllum Merr. is possibly to be considered a synonym of the present variety, it is placed under the incompletely known species (p. 106).

44. Prunus lancilimba (Merr.) Kalkm., *comb. nov.* — *Pygeum lancilimbum* Merr., J. Arn. Arb. 19 (1938) 34; Vidal, Not. Syst. 13 (1948) 296. — *Pygeum caudatum* Merr., Brittonia 4 (1941) 87.

Typification: *Pygeum lancilimbum: Pételot 4499*, holotype in A, isotypes seen from BO, P, US; paratypes: *Pételot 4588* (US), *4589* (P, US), *4592* (P, US).

Pygeum caudatum: Ward (Vernay-Cutting-Exp.) 37, holotype in NY *(non vidi)*, isotype seen from BM; paratype: *Ward (Vernay-Cutting-Exp.) 136* (A).

Tree of small or medium size. *Twigs* pubescent, glabrescent. *Leaves* lanceolate, 8—16 by 1½—3½(—5) cm, index (3—)4—5, base acute to more or less rounded, apex tapering to a long, narrow point, herbaceous to slightly coriaceous, pubescent when young, glabrous or almost so when mature; nerves 5—8 pairs, rather steeply ascending, flat to slightly impressed above, prominent beneath, venation inconspicuous; basal glands 2, flat, usually little conspicuous, always at some distance from the corner, additional glands none; petiole ½—1 cm, pubescent, glabrescent. *Stipules* 8—11½ by 1—1½ mm, index 6—9, pubescent on either side, margin with or without glands. *Racemes* solitary or in fascicles of 2(—3), in axils of (rarely already fallen) leaves, ½—2½ cm; peduncle 0; rachis pubescent. *Bracts* (fig. 5d) tripartite, i.e. over 1—1½ mm connate with their about

equally long stipules, 3½—5 mm long, pubescent outside, sparsely so inside, margins of the stipules sometimes with glands. *Pedicels* 1—3 mm, pubescent. *Hypanthium* 2—3 mm high, pubescent outside, on inside only hairs on bottom. *Perianth segments* 7—12, subequal, or unequal but not regularly divided into sepals and petals, 1—2 mm long, hairy. *Stamens* 15—25; filaments up to 6 mm, glabrous; anthers 0.6—1 mm long. *Ovary* glabrous, very rarely with some few hairs. *Fruits* (few seen) obovoid, pointed, 16—17 by 10 mm, glabrous; endocarp glabrous; seedcoat glabrous.

Distribution. S. China (Yunnan), Burma (Hpyepat Ridge), N. Vietnam (near Cha Pa). — Fig. 32.

Ecology. Evergreen hill-forest, 1200—2800 m.

Remarks. This species is remarkable for its tripartite bracts, long stipules, and obovoid fruits.

45. Prunus oocarpa (Stapf) Kalkm., *comb. nov.* — *Pygeum oocarpum* Stapf, Trans. Linn. Soc. Bot. 4 (1894) 144; Koehne, Bot. Jahrb. 51 (1913) 206; Merr., Enum. Born. (1921) 289.

Typification. *Pygeum oocarpum: Haviland 1118*, holotype in K, isotypes seen from BM, CAL, SAR, SING.

Tree, up to 15 m, or shrub. *Twigs* densely woolly pubescent, rather tardily glabrescent. *Leaves* ovate to elliptic-ovate, 4—10(—13) by 3—6(—8) cm, index 1—2(—2½), base rounded to subcordate or cordate, rarely rounded and decurrent, apex rounded to obtuse, margin usually revolute, stiff and hard when dry, densely woolly pubescent when very young, indumentum disappearing with age, leaving both sides (especially the upper) distinctly dotted and usually the main nerves still pubescent; nerves 7—11 pairs, flat to slightly impressed above, prominent beneath, venation slightly impressed above, usually flat beneath; basal glands 2 (rarely 3 or 4, or absent), distinct, slightly bulging above, additional glands usually absent; petiole up to ½ (rarely up to 1¼) cm, woolly pubescent. *Stipules* 3½—5 by 2—2¾ mm, index 1½—2½, hairy outside, (almost) glabrous inside, marginal glands rarely present. *Racemes* simple or with 1 or 2 side-branches near the base, in axils of (sometimes already fallen) leaves, up to 3(—5) cm; peduncle very short or 0; rachis densely pubescent. *Bracts* up to 4 mm long, 1—4 mm wide, hairy outside, glabrous inside; bracteoles sometimes present, *c.* 2 by ½ mm. *Pedicels* usually less than 2 mm, densely pubescent. *Hypanthium* 2—3 mm high, densely pubescent outside, on inside only hairs on bottom. *Perianth segments* 7—11, subequal, up to 2 mm long, densely hairy. *Stamens* usually less than 20, rarely up to 32; filaments up to 3 mm, glabrous; anthers 0.4—0.7 mm long. *Ovary* densely hairy; style up to 3½ mm. *Fruits* (fig. 6 f) ellipsoid or ovoid-ellipsoid, 8—11 by 6—8 mm, 1.3—1.4 times as long as wide, still more or less hairy; endocarp glabrous; seedcoat glabrous.

Distribution. Borneo (Sabah, Brunei, N.Sarawak). — Fig. 36.

Ecology. Montane and subalpine (mossy) forest, sometimes on exposed ridges, *c.* 1400—3200 m.

Compilation of field-notes. Leaves dark green and glossy above, pale green beneath. Hypanthium probably brown-hairy, perianth cream-coloured, stamens white. Fruits reported as reddish when ripe.

Remarks. Usually well-recognizable: densely pubescent twigs, dotted leaves with cordate base and distinct glands, short racemes, ellipsoid fruits.

46. Prunus malayana Kalkm., *spec. nov.*

Type : *Nur SFN 32695*, holotype in L, isotypes seen from KEP, SING.

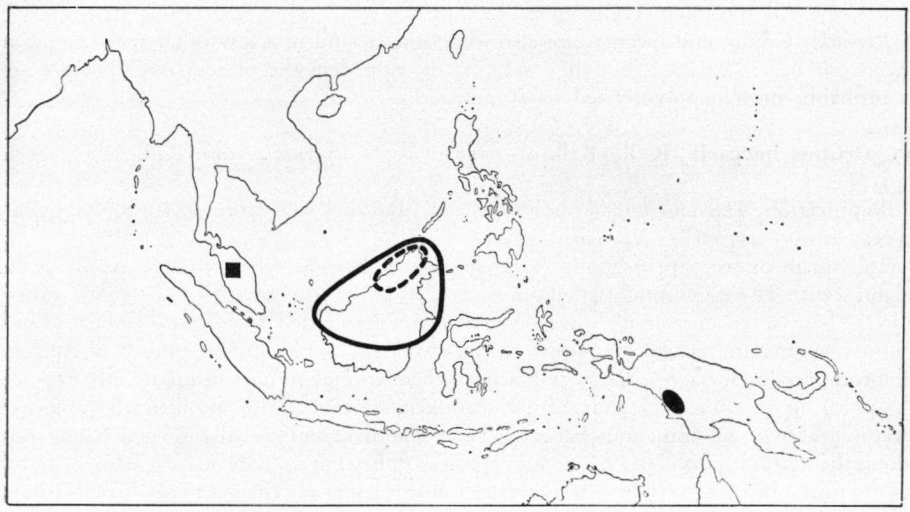

Fig. 36. Distribution of 45. *P. oocarpa* (— — — —), 46. *P. malayana* (■), 47. *P. beccarii* (————), 48. *P. versteeghii* (in solid black).

Rami primo pubescentes, glabrati. Folia elliptica vel elliptico-ovata, 12—19 × 6—13 cm, basi truncata vel subcordata, subtus puberula, adulta subglabra, nervis utrinque 12—15, glandibus basalibus 2, subexcavatis, vel deficientibus; petiolus ad 1½ cm longus. Stipulae ad 11 × 3 mm, basi longitudine c. 1 mm connatae. Racemi compositae, ramis lateralibus usque ad 5, axillares, 5—10 cm longi, rachi pubescente. Pedicelli ad 2½ mm longi. Hypanthium 2 mm altum. Perianthium subregulare, 5- vel 6-merum; sepala triangularia; petala elliptica, ut sepala ad 1 mm longa. Stamina 50—70. Ovarium pilis paucis munitum. Drupa subglobosa ad ellipsoidea, 21—22 × 16—20 mm; testa apice pilis nonnullis obtecta.

Large tree. *Twigs* pubescent when young, glabrescent. *Leaves* elliptic to elliptic-ovate, 12—19 by 6—13 cm, index 1½—2, base truncate to subcordate, apex obtuse to shortly and bluntly acuminate, herbaceous, (almost) glabrous above, shortly pubescent beneath but hairs only remaining on the main nerves; nerves 12—15 pairs, flat above, prominent beneath, venation indistinct; basal glands 2, large, slightly sunken, in some leaves absent, additional glands usually present, flat, small; petiole up to 1½ cm, pubescent, glabrescent. *Stipules* up to 11 by 3 mm, intrapetiolarly connate at base over *c.* 1 mm, pubescent or the inside more or less glabrous. *Inflorescence* a true panicle (compound raceme), with up to 5 lateral branches, in axils of leaves or their scars, 5—10 cm; peduncle ½—1 cm; rachis pubescent. *Bracts* not seen. *Pedicels* up to 2½ mm, pubescent. *Hypanthium* 2 mm high, hairy outside, inside only long hairs on bottom. *Perianth* differentiated as 5—6 sepals and 5—6 petals, not always entirely regular, sepals and petals both up to 1 mm long and densely hairy outside, the sepals triangular and with a broader base than the more elliptic petals. *Stamens* 50—70; filaments up to 4½ mm, glabrous; anthers *c.* ½ mm long. *Ovary* with many long hairs round insertion, some few hairs higher up; style up to 3 mm (mature?), glabrous or with few hairs. *Fruits* subglobular to ellipsoid, 21—22 by 16—20 mm, almost glabrous; endocarp glabrous; seedcoat with hairs at apex.

Distribution. Malaya, the five specimens seen all collected in Pahang (Cameron Highlands, Fraser Hill). — Fig. 36.

Ecology. All specimens collected at 1200 m.

Remarks. Compound racemes are also sometimes found in a few other species (*i.a.* in *P. beccarii* and *P. oocarpa*), but they are best developed in the present one. The species is probably most closely related to *P. polystachya*.

47. Prunus beccarii (Ridl.) Kalkm., *comb. nov.* — *Pygeum beccarii* Ridl., Kew Bull. (1938) 281.

Typification: *Haviland b.r.o.b.*, holotype in K, isotypes seen from SAR, SING; paratypes: *Beccari 3516* (P), *Haviland 755 (non vidi)*.

Tall shrub or tree up to 27 m. *Twigs* sparsely pubescent when young, usually early glabrescent. *Leaves* elliptic or elliptic-ovate, (6½—)8—12 by (3—)5½—8 cm, index 1½—2, base acute or rounded and decurrent, apex rounded to obtuse or shortly and bluntly acuminate, coriaceous, upper surface sparsely pubescent on midrib or entirely glabrous, lower surface sparsely pubescent when young, indumentum usually rapidly disappearing; nerves 4—7 pairs, slightly sunken above, prominent beneath, venation invisible above, inconspicuous beneath; basal glands absent, usually several flat glands along the margin; petiole 1—2 cm, very sparsely pubescent to glabrous. *Stipules* 5—6½ by 2—5 mm, index 1—3, (almost) glabrous outside, sparsely hairy to glabrous inside, ciliate, outer surface of mature stipules usually with one large, hollowed gland (fig. 8c, d). *Racemes* in fascicles of 3 or 4, or in a compound raceme with 1—3 lateral branches at the base, in axils of fallen leaves, up to 5½ cm; peduncle up to ½(—1½) cm; rachis pubescent. *Bracts c.* 2 mm long, hairy outside, (sub)glabrous inside, the lowermost bracts of the fascicle often tripartite. *Pedicels* up to 2 mm, pubescent. *Hypanthium* 1½—2 mm high, hairy outside, inside usually with hairs on the bottom. *Perianth segments* 6—8, subequal, small, often distant, ½—1 mm long, usually densely hairy. *Stamens* 15—40; filaments up to 3½ mm, glabrous; anthers 0,3—0,5 mm long. *Ovary* mostly with some hairs around insertion, otherwise glabrous or nearly so; style up to 4½ mm. *Fruits* (only one fruiting specimen seen) transversely ellipsoid, 7 by 9—10 mm, almost glabrous; endocarp hairy; seedcoat hairy.

Distribution. Borneo (Sabah, Sarawak, Indon. Borneo), also Sumatra? (see Remarks). — Fig. 36.

Ecology. Forest, 0—600 m.

Compilation of field-notes. Once noted with small buttresses. Bark brown, smooth, smelling of bitter almonds, living bark 2—8 mm, brown. Wood brown (once noted). Flowers whitish or yellowish green.

Remarks. The eight collections seen are rather uniform, with the exception of *Singh San 24015* which differs in some minor points.

Remarkable are the hollowed glands on the stipules, a character only found in this species. As is pointed out in Chapter 5 (p. 19) those glands may be considered to be homologous to the also usually hollowed basal leaf-glands in *P. polystachya*, to which the present species is related.

A specimen from Sumatra *(Grashoff 1009)* has identical leaves and stipules, but cannot be identified with certainty because it is sterile.

48. Prunus versteeghii Kalkm., *spec. nov.*

Type: *Versteegh BW 4843*, holotype in L, isotypes not seen but present in MAN and some other herbaria.

Rami sparse pubescentes, glabrati. Folia oblonga vel oblongo-ovata, 10—15 × 4—6½ cm, adulta subglabra, nervis utrinque 7—9, glandibus basalibus 2, planis, majusculis;

petiolus ¾—1 cm longus. Racemi solitarii et in fasciculis 2—3 aggregati, axillares, in anthesi 3—5 cm longi, rachi pubescente. Pedicelli 1—2 mm longi. Perianthium dichlamydeum, 5-merum; sepala triangularia, c. 1 mm longa; petala obovata, sepalis aequilonga. Stamina 40—45. Ovarium pubescens. Drupa transverse ellipsoidea vel didyma, 17—19 × 28—30 mm, mesocarpio crassiusculo ac lignaceo, ¾—1 mm diam., endocarpio tenuiori; testa glabra.

Tree *c.* 25 m. *Twigs* sparsely pubescent, glabrescent. Leaves oblong to oblong-ovate, 10—15 by 4—6½ cm, index 2½—3, base rounded, apex acute, herbaceous, very sparsely pubescent to glabrous when mature (young leaves not seen); nerves 7—9 pairs, flat to slightly impressed above, prominent beneath, venation not conspicuous; basal glands 2, flat, rather large, additional glands absent; petiole ¾—1 cm, sparsely pubescent, glabrescent. *Stipules* (one seen) *c.* 6 by 2 mm, densely pubescent outside, glabrous inside, marginal glands present. *Racemes* solitary or in fascicles of 2—3, in axils of leaves or their scars, 3—5 cm, in fruit up to 10 cm; peduncle 0—½ cm; rachis pubescent. *Bracts* up to 3 mm long, pubescent outside, glabrous inside, lower ones sometimes tripartite. *Pedicels* 1—2 mm, pubescent. *Hypanthium* 2 mm high, densely hairy outside, sparsely long-hairy inside, denser on the bottom. *Perianth* differentiated as 5 triangular sepals and 5 obovate petals, both *c.* 1 mm long, but petals narrower than sepals, both hairy. *Stamens c.* 40—45; filaments 1½ mm, hairy at base; anthers 0.5—0.7 mm long. *Ovary* probably hairy (only pistillodes seen). *Fruits* transversely ellipsoid to didymous, 17—19 by 28—30 mm, 1.5—1.7 times as wide as long, sparsely hairy when mature; mesocarp rather thick and woody, ¾—1 mm thick *in sicco*, endocarp stony, thinner, *c.* ½ mm, glabrous; seedcoat glabrous.

Distribution. West New Guinea: Digul R., Lorentz R. — Fig. 36.

Ecology. Forest, about sea-level.

Compilation of field-notes. The type has 1½ m high buttresses, smelling bark, dirty white flowers, and red fruits. The only other specimen seen *(v. Roemer 16)* has purple fruits.

Remarks. Although only 2 specimens are known, this seems to be a well-defined species, with a rather isolated position. From *P. turneriana* and *P. schlechteri*, to which species it bears some likeness, it differs in its fascicled racemes and glabrous seedcoat, from the latter also in the much larger fruits.

Named in honour of Chr. Versteegh, friend and one-time colleague, the collector of the type.

INCOMPLETELY KNOWN SPECIES

Pygeum macropetalum Koehne, Bot. Jahrb. 51 (1913) 198. — Syntypes: *Forbes 2343* (CAL, L), *Forbes 2354a* (L). Both specimens are in flower, *2354a* was, according to Baker, J. Bot. 62 (1924) Suppl. 33, collected at 1800 m alt. on Mt Dempo in Sumatra. A sterile specimen from Mt Kerintji *(Meijer 6434)* is possibly conspecific.

Although incompletely known, this species must almost certainly be placed near *P. grisea, ceylanica,* and *wallaceana.* From the latter which it resembles most, it differs in the longer racemes (up to 15 cm), the longer pedicels (up to 8 mm), and the larger flowers (hypanthium 3—4 mm high). In view of these differences and because of the gap in the distribution, I have not made a definite decision.

Pygeum odoratum Henders., Gard. Bull. Str. Settlem. 7 (1933) 101, pl. 20. — Type: *Henderson SFN 23278* from Cameron Highlands in Malaya, at 1440 m alt. (BO, CAL, K, SING). Conspecific is *Holttum SFN 31255* (A, K, KEP, L, SING).

The type has mature flowers, the other specimen only buds. With the material at

hand, the species cannot be placed with certainty. It resembles *P. kinabaluensis*, but differs *i.a.* in having a more or less hairy ovary.

Pygeum ramiflorum Merr., Philip. J. Sc. 9 (1914) Bot. 447. — Type: *Vanoverbergh 2820* from Luzon (P). Conspecific is *Ramos & Edaño BS 37913*, also from Luzon (A, BO, K, L, US).

Both specimens are in flower, they probably represent a separate species, related to *P. arborea*.

Pygeum sterrophyllum Merr., Pap. Mich. Acad. Sc. 19 (1934) 156. — Type: *Bartlett 8014* from Tapanuli, Sumatra (K, L, US). Probably conspecific is *Batten-Pooll s.n.* from N. Sumatra, alt. 2000—2380 m (SING).

Both specimens are in flower. The species is possibly to be placed near *P. arborea* var. *densa*, but its position cannot be decided upon without fruiting material.

DUBIOUS SPECIES

Amygdalus cochinchinensis Lour., Fl. Cochinch. (1790) 316. — *Prunus cochinchinensis* (Lour.) Koehne, Bot. Jahrb. 52 (1915) 300; Vidal, Adansonia 4 (1964) 143.

This will remain a mystery, I am afraid; see the discussion by Vidal l.c.

Pygeum ferrugineum Koehne, Bot. Jahrb. 52 (1915) 338. — Syntypes: *Ledermann 11208, 11398* from New Guinea.

The types were lost at Berlin. Judging from the description the species is near, or possibly identical with *P. brassii*.

Pygeum griffithii Hook. *f.*, Fl. Brit. Ind. 2 (1878) 322. — Type: *Griffith 2050* from Malaya (K).

This sheet, the only one I saw, has only some fragments of flowers left on the racemes. I cannot match it with other species, although it might be a hairy form of *P. lamponga*. The name *Pygeum griffithii* has been applied incorrectly by Koehne, who described under this name the specimen *Griffith 2055* which is *P. arborea* var. *arborea*.

Pygeum ledermannii Koehne, Bot. Jahrb. 52 (1915) 340. — Syntypes: *Ledermann 9028, 9396, 11708* from New Guinea.

The specimens were lost in Berlin; according to the description the species is near *P. pullei*.

Pygeum polyadenium Koehne, Bot. Jahrb. 51 (1913) 192. — Type: ?*Korthals s.n.* from Sumatra (L).

The type specimen is sterile and does not permit a reliable identification. Possibly it is *P. arborea*.

Pygeum steinii v. Malm, Fedde Rep. 42 (1937) 14. — Type: *Stein 906* from Timor.

The type was lost in Berlin. Judging from the description, it could be *P. grisea*.

EXCLUDED SPECIES

Prunus? laurifolia Decne, Nouv. Ann. Mus. Paris 3 (1834) 458. — *Laurocerasus laurifolia* (Decne) Roem., Synops. 3 (1847) 91 = **Buchanania arborescens** Bl. See Merr., Philip. J. Sc. 10 (1915) Bot. 35, and Hall. *f.*, Beih. Bot. Centralbl. 34 (1916) 24.

Pygeum grandiflorum King, J. As. Soc. Beng. 66,2 (1897) 288, identified as *Tristania spec.* by Hall. *f.*, Med. Rijksherb. 35 (1918) 33 = **Symplocos odoratissima** Choisy. The type specimen, *King's coll. 7425*, was identified as such by Mr H. P. Nooteboom, who is occupied with a revision of *Symplocos*.

Pygeum nervosum Elmer *(in herb.) ex* Koehne, Bot. Jahrb. 52 (1915) 337 = **Beilschmiedia assamica** Meisn., according to Hall. *f.*, Med. Rijksherb. 35 (1918) 33. The type specimen, *Elmer 11833*, is certainly a Lauracea.

Pygeum viride Baker *f.*, J. Bot. 62 (1924) Suppl. 34 = **Symplocos odoratissima** Choisy, according to an identification of the type *(Forbes 2876)* by Mr H. P. Nooteboom.

IDENTIFICATION LIST

In this list have been enumerated all fertile, numbered collections, that with reasonable certainty could be assigned to one of the species treated. Sterile specimens have as a rule been omitted, as are specimens without a collectors' number.

The *numbers in italics* referred to are those of the species in the present paper; ? before the number means that identification is uncertain; types are indicated by (T) after the number.

Specimens collected in series (BW, CF, NGF, PNH, San, etc.) have been cited under the name of the collector, if this is mentioned on the labels of distributed duplicates.

Achmad 778, 978, 1781: *43a*. Acocko 12227: *2*. Adamson 10: *2*. Aet 562: *33*. Ahern's coll. FB 1134: *27*; FB 2652: *17a*; FB 3092, FB 3342: *27*. Ahmad CF 4572, CF 4762: *41*; CF 5022: *43a*. Alcasid & Edaño PNH 4544: *24*. Aldos PNH 33469: *17a*. Alston 899: *16*. Alvarez FB 18547: *27*. Alvins 505: *17b*; 769/851, 1035: *43a*; 2131, 2218, 2272: *17b*. Amdjah 733: ?*21*. Amihan PNH 33373: *17a*. Anderson S 426, S 2602, S 2731: *42*; 4527: *45*; 4707: ?*43e*; 5674: *43c*; 12402, 12437, 12879: *42*; 13123: *42* (T). Armitage 49542: *2*. Ashton Brun 2392: *45*. Atmowisastro 1204: *7*.

Backer 27868, 27887: *17a*. Badak San 32370: *17b*. Baenitz 1082: *5*. Bagshawe 1537: *2*. Bakhuizen v. d. Brink 7673: *13*. Bakhuizen v. d. Brink f. 3387: *13*. Balansa 3391, 3392: *10* (T). Bally 4356, 6451, 7653: *2*. Bancroft FH 49: *2*. Barber 5990, 5999: *15*. Barnes FB 49: *27*. Bartlett 6871: *41* (T); 8014: *Incompl. known spec.*; 8661: *7*. Bawan FB 24609: *17a*. Beccari 52, 258: *7*; 358: *43a* (T); 3516: *47* (T); 3895: *43a*. Beddome 2692, 2693, 2694, 2695: *15*. Bequaert 4500: *3* (T). Bernardo FB 20868: *27*. Best 2342: *43a*. Beumée 3836, 5670: *43a*. Biswas 5766: *11*. Blume 42: *17a*; 654: *43a* (T); 1740: *43a*; 1931: *13*; 2206/a: *17a*. Boerlage 460: ?*17a*; 521: *43a*. Bon 4213: *10* (T). Bonar Kep 2143: *17b*. Boom 2829a: *5*; 10002: *4*. Boot 3336: *12*. Bor 6275, 6481: *7*; 16318: *6*. Borden FB 1806: *17a* (T); FB 2064, FB 2366: *27*; FB 3044: *17a*. Borgmann 88: *38b*. Bornmüller 590: *4*. Borromeo FB 24632: *27*. v. Borssum Waalkes 2876: *43c*. Bourdillon 392: *15*. Bourne 345, 474: *15*. Bracelin 1309, 2312: *4*; 2632, 2768: *5*. Braganza 166: *15*. Brandenburg v. d. Gronden 3: *38a*. Brass 1386, 1386A: ?*31*; 2727: *33* (T); 4221: *32*; 4884: *33*; 5292: *31*; 7308: *30*; 7858: *43a*; 9035, 9103: *32* (T); 10844: *32*; 11315: *17a*; 11531, 11532: *17a* (T); 17026: *2*; 21823, 22076, 22142: *31*; 22552: *33*; 22595, 22709, 22731: *36*; 22814: *36* (T); 22818, 22958, 23301: *17a*; 23654: *30*; 25603: ?*18*; 28600: *30*; 29719: *34*; 29858: *38b*; 30379, 30518: *37*; 30658: ?*32*; 30661: *37*; 30756: *17c*; 31362: *37*; 31397: ?*38a*; 31437: *22*. Brass & Collins 31023: *38b*; 31282a: *17c*; 32156: *22*. Brass & Meijer Drees 9647, 9995: *38a*; 10428: *32* (T). Brass & Versteegh 10454: *32*; 10467: *17a*; 10471: *32*; 10480: *17a* (T); 11179, 11952: *32*; 13137: *31*; 13187: ?*30*. Brass & White 183: *35*. Bruggeman 204: *17a*; 578: *43a*; 582: *17a*; 609: *43a*. Brunig S 8664: *43c*; S 8671, S 8694: *21*. Buchanan 337: *2*. Bullock 3208: *2*. Bünnemeyer 1788: *43c*; 3565, 3845: *7*. Burger 2617: *43a*; Burkill SFN 827: *43a*; 1811: *41*; 2043: *17b*; 2682: *43e*. Burkill & Haniff SFN 16947, SFN 17092: *17b* (T). Burkill & Holttum 7824, 8405: *17b*; SFN 8505, 8558: *43e*. Burma For. Dept. 317: *15*. Burn-Murdoch 389: *41*. Buwalda 3548: *17a*; 5642: *39*; 5683, 6127: *43a*.

Cailipan FB 26018: *27*. Cantley 29: *41*. Carr 12373, 12630: *35*; 12726: *30*; 13028: *17c*; 13268, 13489, 13490: *33*; 13666: *34*; 13678: *33*; 13762, 13862: *17c*; 14139: *33*; 14153, 14173: *34*; 14676, 14858: ?*31*; 14937:?*17a*; 14943, 14944: *33*; 15093, 15097: *17c*; 15705: *34*; 15902:?*31*; 16149, 16150, 16213, 16319: *31*; 16374, 16390: *30*; SFN 26477: *43c*; SFN 26769, SFN 27205: *24*; SFN 27491: *45*; SFN 27537: *25*; SFN 27664, SFN 27674: *45*; SFN 27674A: *19*. Cavalerie 2601: *7*. Champion 1127: *15*. Chapin 416: ?*3* (T). Chapman BSIP 425: *33*; 563: *2*. Chase 924, 1325, 1762, 3946, 4904, 5068: *2*. Cheesman 7439: *2*. Chen 799, 811: *8*. Chevalier 31264: *43d* (T). Chew, Corner & Stainton 163: *14*; 191: *43c*; 1054: *45*; 1072: *43c*; 1097: *14* (T); 1115: *43c*; 2769: *24*. Chin 6758: *43d*. Ching 7568: *43d*; 7658: *10*; 7841, 8142, 8304: *43d*. Chitr RFD 17982: *15*. Chow 1302: *8*; 1537, 1691: *11*. Chun 4819, 4879, 5067, 5636, 5736, 5742: *9*; 5768: *8*; 5802: *9*; 6409, 6492, 6590: *43d*; 6695: *9*. Chun & Tso 44221: *9*. Chung 3696, 6732, 6793, 6800, 8481: *9*. Clarke 15865: *7*; 17983: *15*; 18679: *9*; 43128: *15*; 44218, 44749: *43d*; 44807: *7*; 45355: *9*. Clemens 146: *31*; 760: *26* (T); 897: *31*; 1251 bis: *33*; 1967: ?*34*; 2415: ?*32*; 3204: *31*; 3359: *32*; 5629: ?*38b*; 5636, 6270: *33*; 6272: *17c*; 6523a, 7186: *31*; 7833, 7888: *33*; 8066, 8254: *31*; 8305a: *30*; 8543a: *31*; 8916: ?*33*; 9260: *31*; 9452: *32*; 9588: *17c*; 11058: ?*33*; 11152: *33*; 11164: *32*; 11200: *43c* (T); 12324 bis: *32*; 17161, 17162: *27*; 20952, 26607, 26877, 27056, 28045: *43c*; 28213: *25*; 28327: *24*; 28477: *25* (T); 28988: *43c*; 29102: *45*; 29334: *24*; 29404: *25*; 29527: *19* (T); 29540, 29752: *43c*; 29855: *45*; 30217, 30218, 30503, 30538: *43c*; 30771: *24*; 30961, 30969, 31032: *43e*; 31056: *45*; 31265: *24*; 32311: *45*; 32702: *43e*; 32855: *43c*; 33686: *45*; 33940: *43c*; 34000, 34373, 34452: *25*; 35059, 40596, 40634bis: *43c*; 40755: *24* (T); 40846: *43e*; 40995: *19*; 41135, 41758, 41852: *31*; 50259: *17b*; 50416, 50564: *43e*; 50565: ?*17b*; 50638: *45*. Collins 466: *15*. Conklin PNH 17473: *27*. Conklin & Del Rosario PNH 72397: *43a*. Cooke 89: *15*. Corner SFN 21308: *21*. Cowan 1890: *15*. Cowley s.n.: *35* (T). Crutwell 1171: *17c*. Cubitt CF 928: *41*. Cuming 797: *27*, 1815: *17a* (T). Curran FB 3869: *17b*; FB 6317,

FB 10007: *27;* FB 10028: *17a;* FB 10037, FB 10063: *27;* FB 10230, FB 10442: *17a;* FB 10933: *27;* FB 17081, FB 17556: *17a.* Curran, Merritt & Zschokke FB 18212: *27.* Curtis 162: *43e;* 216, 735: *17b;* 1293: ?*43a;* 2315, 3472: *17b.*

Danao FB 12427: *27.* Darbyshire 285: *31.* Darbyshire & Hoogland 8249: *30.* Darling FB 14560: *27.* Derry 930: *43a.* Djamhari 232: *17a.* Dolman 27608: *43e.* Duldulao FB 24234: *29.* Dumas 1603: *41.* Dümmer 1660, 2420: *2.* Dunn 2661: *9.*

Eberhardt 2431: *10* (T). Edaño PNH 6787: *29;* PNH 17883, PNH 17954, BS 41664, BS 78498: *27;* BS 79357: *29.* Ede 35: *2.* Eggeling 1270, 2402, 6221: *2.* Egon 578, 584, 822: *43c;* 923: ?*43c;* 1032: *43c.* Elmer 6110, 6697, 7146: *27;* 7504: *29* (T); 7662, 7825, 8379, 8893: *27;* 9787: *29* (T); 11095: *17a* (T); 11729: *26* (T); 11828: *17a* (T); 11833: *Excl. Spec.;* 11857: *28* (T); 11910, 12137: *17a* (T); 12210: *28* (T); 13198: *17b* (T); 13200: *23* (T); 14067: *28* (T); 14772: *17a;* 15246, 15258, 15286, 15617: *27;* 18406: *17a.* Endert 865: *43a;* 2247: *13;* 3276: *43a.* Espinosa FB 6411: *17a.* Eyles 8502: *2.* Eyma 5119, 5206, 5227, 5403, 5415: *38a.*

Fairchild 101: *43c;* 564: ?*17b.* Fang 1314: *9* (T); 2460, 2572: *7.* Fanshawe 1505: *2.* Feng 11148: *9;* 11889: *44;* 11925: ?*9;* 11997, 12040: *6;* 12765, 12833, 12937, 13044, 13760, 13900: *7.* Fénix BS 15724: *17a.* Fischer 151: *1;* 2788, 3810: *15.* Floyd NGF 5260: *31.* Floyd & Havell NGF 7521: *30.* Forbes 14: ?*35;* 529: *33* (T); 655: *17c* (T); 793: *30;* 901: *43a;* 991: *17a;* 2343, 2354a: *Incompl. known Spec.;* 2728: *13* (T); 2876: *Excl. Spec.;* 3678: *43b* (T); 3680, 3905: *17a* (T). Forestry School FB 20148: *17a.* Forrest 8200: *9;* 9212: *7;* 10716: *11;* 11861, 12306: *9;* 12695, 12762, 13332, 13479, 13502, 15562: *11;* 15750, 15802: *9;* 16105: *7;* 17489: *9;* 17529, 17533: *7;* 17710, 17721: *9;* 17742: *7;* 17760, 17888, 18112: *9;* 18476, 18573, 18831: *7;* 24021: *9;* 24024, 25164, 25213, 25399, 25657, 25844: *7;* 26500: *9;* 29826: *7.* Fox PNH 4845: *17a.* Foxworthy BS 731: *13.* Frake PNH 36173: *26.* Franco FB 17860: *27.* Fung 20182: *10.*

Gabot PNH 33449: *17a.* Gaetan 36: *2.* Gallatly 24: *15.* Galoengi 496: *43c.* Gamble 14339, 14472: *15* (T); 15941, 17033, 21406: *15.* Gammie 267: *6.* Gane 43: *2.* Gardner 275, 276: *15;* 482: *16;* 1505: *2.* Gelvoria PNH 34329: *17a.* Germain 3135, 3425, 3501: *2.* Gerstner 4861: *2.* Ghesquière 3888, 4276: *2.* Gillett 5173, 14717: *2.* Giulianetti s.n.: *32* (T); Gjellerup 577: *30* (T). Gonzales PNH 34303: *17a.* Goodenough 1737, 1872: *43a.* Goodenough & Ridley 1561: *43a.* Gossweiler 9751: *2.* Grashoff 893: *41;* 921: *43a;* 1009: *see note sub 47.* Gray NGF 5208: *31.* Greenway & Trapnell 5728: *2.* Griffith 378: *7;* 2050: *Dub. Spec.;* 2051: *20* (T); 2052: *43a;* 2054: *43d* (T); 2055: *43a;* 2063: *7;* 2067: *6* (T); 2071: *9;* s.n.: *43a* (T).

Haines 5, 668, 1052: *15.* Hallier 281, 281a: *27;* 281b: *17a;* B 1008: *13;* 1603: *42;* 2674: *43e;* 3079: *43c;* 3306: ?*24;* 3439: *43e;* 4281, 4281a: *27.* Hamid CF 6393: *41.* Hamilton 1170: *15.* Hance 6015: *9* (T). Handel-Mazetti 11132: *9;* 12516: *8;* 12809: *9;* 13013: *11.* Haniff SFN 3352: *17b;* SFN 9132: *43e;* SFN 21017: *17b.* Haniff & Nur SFN 7958: *43e;* SFN 8053: *17b.* Harley 9360: *2.* Hartley 10153: *31.* Hashim 389: *41.* Havel & Kairo NGF 11138: *33;* NGF 11183: *31.* Haviland 104: *partly 42, partly 47;* 1118: *45* (T); 1524/e.o.c.: *24;* 2011: *21;* 2063: *17b* (T); 2144: *21;* b.l.r.v.: *47;* b.r.o.b.: *47* (T). Haviland & Hose = 104: *21;* 3378: *43c.* Heawood 101: *15.* Helfer 2053: *43d* (T); 2056: *17b.* Henderson 11447A: *17b;* 17894, SFN 21352: *43e;* SFN 23278: *Incompl. known Spec.;* SFN 23558: *46;* SFN 23616: *43c;* SFN 37391: *41.* Henry 47: *9;* 7188, 10511: *11;* 11173: *7* (T); 11333: *9;* 11666: *9* (T); 12313, 12313A, 12313B, 12708: *43d* (T); 12887: *1* (T); 12943: *11;* 13187, 13187A: *7* (T); 13447: *43d.* Henty NGF 10526: *18* (T); NGF 10620: *33;* NGF 11910: ?*31.* Herman 2025, 2301, 2347: *2.* Ho 1686: *11.* Hollrung 660: ?*17a* (T). Holmberg 870: *43a.* Holttum SFN 9470, SFN 9815: *17b;* SFN 10783: *43e;* SFN 15152: *17b;* SFN 19855: *43e;* SFN 19887: *17b;* SFN 20770, SFN 31249: *43e;* SFN 31255: *Incompl. known Spec.* Holyoak 720: *2.* Hoogland 3957: *35;* 3966: *30.* Hoogland & Pullen 5439: *37* (T); 5612, 5742: *38b;* 6264: *31.* Hooker s.n.: *15* (T). Hooker & Thomson 398, 399: *7;* s.n.: *15* (T). Hose 186: *17b* (T). How 70341, 71520, 71653, 71796, 72723: *10;* 73088, 73774: *43d.* How & Chun 70245: *43d.* Hsiung 6207: *8;* 6532: *9.* Humbert 8040: ?*3* (T). Hume 7880: *17b;* 9656: *41.*

Iboet 445: *39.* Ichlas 119: *7.* Iwanggin BW 5750, BW 10009: *43a.*

Ja'amat Kep 35903: *41;* Kep 35950: *7;* Kep 36531: *43e;* Kep 37548: *43c.* Jackson 349a: *2.* Jaheri 159: *17a.* Junghuhn 107: *17a* (T); s.n.: *see 13, 17b, 43a* (T).

Kadim & Noor 604: *43e.* Kajewski 1189, 1221, 1346: *35;* 2383, 2483, 2581: *33.* Kalkman 4437: *38a.* Kandilis San 10323: *13.* Kanehira & Hatusima 12040: *30;* 14094: *17c.* Kanjilal 3321: *43d;* 3539: *15;* 4531: *7;* 4542: *43d;* 4610: *15.* Keay & Lightbody FHI 28377: *2.* Kep (= For. Res. Inst., Kepong) 51261: *43a;* 73516: *17b.* Kerr 6411: *7;* 9403: *15;* 15301: *17b;* 15501: ?*43d* (T); 16525: *43d;* 17167: *17b* (T); 17492: *43d;* 17769, 19150: *17b.* Kiah SFN 31761: *17b.* Kiah & Strugnell SFN 23929: *7.* King's coll. 81, 95, 102, 157, 233, 379, 510, 560: *15;* 1970, 2083, 2753: *17b* (T); 3524: *17b;* 3791: ?*43a* (T); 4789: *17b* (T); 5336: *17b;* 5638: *13* (T); 5676: *41;* 6032: *17b;* 6425: *17b* (T); 6603, 6847: *41;* 6986: *43e* (T); 7236: *43e;* 7329: *43e* (T); 7425: *Excl. Spec.;* 7888: *17b;* 10195: *41* (T); 10196: *43a;* 10396: *41* (T); 10753, 10827: *43e* (T); 10902: *41;* 11020: *43c* (T). Kjellberg 2806: *17a.* Klemme FB 4293: *17a.* Kloss 12109, 12183: *43e.*

Ko 52561: *9*; 56025: *43d*. Kochummen Kep 94402: *17b*. König 6404: *15* (T). Koorders [1]) 25n: *43a*; 457d: *17b*; 653b: *17a*; 1010c: *17b*; 1131a: *17a*; 1163i: *17b*; 1228a: *43a*; 1240c: *17b*; 1266c: *12*; 1292c: *17a*; 1313a, 1318a, 1320a: *43a*; 1327a: *13*; 1334c, 1647m: *17b*; 2009a: *17a*; 2025c: *17b*; 2034a, 2059a: *13*; 2081f: *43b*; 2123a: *43a*; 2133f, 2188f: *43b*; 2208i: *17a*; 3033a, 3059a, 3072a: *43a*; 3091a, 3126a, 3132a, 3225a, 3266a: *17a*; 4099w: *17b*; 4146t, 4189t, 4309w: *43b*; 6373*β*: *43a*; 6380*β*, 6382*β*, 6383*β*, 6386*β*, 6387*β*, 6388*β*, 6389*β*, 6390*β*, 6392*β*: *43a*; 6394*β*, 6395*β*, 6397*β*, 6398*β*: *17a*; 6400*β*: *17a* (T); 6407*β*, 6409*β*: *17b*; (T); 6415*β*: *17a*; 6417*β*: *43a*; 6418*β*: *17a*; 6419*β*: *12* (T); 6462*β*: *17a*; 6464*β*, 6465*β*, 6466*β*, 6467*β*, 9411t, 9417t: *43b*; 11156*β*, 12096*β*: *17a*; 12097*β*, 12243*β*, 12301*β*, 12309*β*, 12328*β*: *43a*; 12582*β*: *17a*; 12670*β*, 12671*β*: *17a* (T); 13111*β*, 13112*β*: *43b*; 13544*β*: *17b* (T); 13984*β*, 14237*β*: *43a*; 14661*β*, 14730*β*, 14731*β*: *43b*; 15360*β*: *17a*; 18551*β*: *13*; 18553*β*, 18555*β*: *26*; 20077*β*, 20250*β*: *17b*; 20298*β*: *12*; 20941*β*: *43b* (T); 21598*β*, 21599*β*, 21701*β*: *43b*; 21704*β*: *43b* (T); 22255*β*, 22486*β*: *17b* (T); 23039*β*: *43b* (T); 23487*β*: *12*; 24125*β*: *17a* (T); 24592*β*: *12*; 25863*β*, 25866*β*, 25867*β*, 25868*β*, 26327*β*: *17a*; 26967*β*, 26968*β*: *17b*; 27060*β*: *12*; 27524*β*: *17b*; 27903*β*: *13*; 29360*β*, 29394*β*: *43b*; 30440*β*, 32157*β*: *43a*; 32159*β*, 32189*β*: *17a*; 32204*β*, 33028*β*: *43a*; 33036*β*: *13*; 33983*β*, 35979*β*: *17a*; 36937*β*: *17b* (T); 36994*β*: *17b*; 37903*β*: *17a*; 38032*β*: *17b*; 41942*β*: *17a*; 47648*β*: *43a*. Korthals 47a: *17a*; 126: ?*21* (T); s.n.: *21* (T). Koster BW 6778: *43a*; BW 7179: *33*. Kostermans 336: *33*; 1088: *43a*; 2291: *17c*; 2384: *38a*; 2411: *17c*; 6331: *17a*; 7276: *13*; 10236: *43a*; 12501, 12504: *47*; 13586: *13*; 18102, 18112, 18194, 18375: *39*; 18587: *39* (T); 18649, 19041: *39*; 19175: *43a*; Kostermans & Anta 515: *21*. Kostermans c.s. KK + SS 154: *43b*; KK + SS 329: *43a*; Kostermans c.s. (Unesco) 142: *43a*; 242: *12*. Kuhl & van Hasselt s.n.: *17a* (T). Kurz s.n.: *13* (T). Kuswata 101: *39*. Kuswata & Soepadmo 217, 300: *43a*. Kyaw 41: *43d*.

Lace 2448, 6013: *7*. Lagrimas 505: *43a*; PNH 37274: *27*. Lajangah San 33077: *24*. Lam 1446, 1506: *17c*; 1865: *38a*; 2725: *39*. Lambach 1297: *43a*. Lambak FMSFN 2726: *13*. Lasquety FB 24005, FB 25292, FB 25295: *27*. Lau 45: *43d*; 2414: *8*; 2485: *43d*; 2544: *9*; 2623: *8*; 2655, 2748: *43d*; 4640: *9*; 4642, 4691: *7*; 4727: *11*; 4778: *9*; 20112: *43d*; 25933, 26773: *10*; 28464: *7*. Lauterbach 1645, 1646: *5*. Lawson 35, 88: *15*. Lazo PNH 33415: *17a*. Leaño FB 24719, FB 25136: *27*. Lebar 3916: *21*. Ledermann 6697: *30*; 6718, 7762: *43a* (T); 7797: *30*; 7889: *33* (T); 8625: *30*; 9028, 9396: *Dub. Spec.*; 9497: *34* (T); 9569: *43a* (T); 10392a: *30*; 11208, 11398, 11708: *Dub. Spec.* Lee & Kao K 3937: *9*. de Leeuw 7: *43c*. Lei 291: *10*; 384, 815: *43d*. Liang 66201: *9*; 69515: *10*; 69816: *43d* (T). Liha & Liha 5802: *4*. Lin 30047: *43d*. Lipaqeto BSIP 3302, BSIP 3416: *33*. Liu 790: *7*; 1772: *43d*; 2006: *7*. Lobb 328: *17b* (T). Loher 2222: *27*; 2223: *17a and 27 mixed*; 2225: *27*; 4510: *17a*; 5969, 5970, 5972, 5973, 5978: *27*; 5979: *17a*; 12621: *27*; 12915: *29*; 13815: *17a*; 13957: *27*; 14217: *23*; 14465, 14509, 14521: *27*. Lörzing 4669, 9431, 9481, 15559: *7*. Los 6208: *12*. Lundquist 239: *33*. Lütjeharms 4360, 4610: *43a*.

MacGregor 722: *7*. Machin 792, 871: *2*. Macrae 229, 454: *16*. Mahamud 8129: *41*. Maingay 625: *17b* (T); 626: *43a* (T); 627: *41* (T); 628: *17b*. Makandy 1: *2*. Manalo FB 7427: *17a*. Mann 55: *15*; 1207: *2* (T). Manson 12: *15 and 43d* (T) *mixed*. Maradjo 73: *7*; 332: *41*; 457: *17b*. Maule FB 381: *27*. Maung Po Khant 11574: *43d*. McClure 7742: *10*. McDonald NGF 5144: *33*. McGregor BS 43568: *27*. McKee 1365: *37*. McViegh & Ridgwell NGF 7332: *31*. Meebold 7093: *7*; 8388, 9986, 10803, 11955, 13867: *15*; 14895: *17b*. Mell 426: *11*. Merrill 1060, 1537, 1707: *27*; 1933, 2258: *17a*. Merritt FB 3719: *27*; FB 6744: *43a*; FB 6784, 6854: *43a* (T); Merritt & Darling FB 13921: *17a*. Metcalf 7516: *9*. Metcalf c.s. 17250: *9*. Metz 2417: *15*. Meijer 3418: *7*; 3548: *17b*; 3740: *7*; 4261: *21*; 4303, 5342, 5371: *17b*; 6434: *Incompl. known Spec.*; 7499: *17b*; 7553, 7559: *20*; San 21983: *43c*; San 22412: *43a*; San 27662: ?*24*. Meyer FB 2629: *27*. Meyer & Foxworthy FB 13575: *27*. Michelson 416: *2*. Mikil San 30322: *43a*; San 31780: *45*; San 31863: *see note sub 43e*; San 32074: *24*; San 34506: *43c*. Millar NGF 9965: *31*; NGF 11787: ?*34*; NGF 12300: *18*. Millard KL 1404, KL 1806: *17b*. Milne-Redhead & Taylor 10877: *2*. Miranda FB 20619: ?*43a* (T); FB 26427: *17a*. Modder 94: *15*. Mogg 28243: *2*. de Monchy 1, 9: *43a*. Monod 11977: *2*. Moon 1256: *2*; s.n.: *15* (T). Mooney 904: *1* (T); 1240: *15*; 1310: *1*; 1551, 1551a: *1* (T); 2669, 2920, 2975: *1*; 5687, 8473: *2*. Mukerjee 257K: *15*. Mulato PNH 35409: *17a*.

Narciso PNH 35308: *17a*. Native collector Thailand 25, S 107: *43d*. Native collector Sarawak 783: *43c*; 1961, 5037: *21*. Ngadiman SFN 36117, SFN 36118: *41*. NGF (Dept. of For., Lae) 2831: *30*; 3144: *18*. Nicholson San 19135: *43c*. NIFS (= Neth. Ind. For. Serv., Bogor) bb 5435: *7*; bb 5635: ?*43a*; bb 6829: *7*; bb 7165, bb 7199, bb 9484: *43a*; bb 9699: *17a*; bb 10109: *43a*; bb 11208: *43e*; bb 11991: *43b*; bb 18846: *43a*; bb 20424: *17a*; bb 22821, bb 23176: *43a*; bb 23944, bb 23945: *7*; bb 24540: *39*; bb 24682: *13*; bb 25462: *43a*; bb 25842: *39*; bb 25892, bb 25989, bb 28254: *43a*; bb 29408, bb 29856: *13*; bb 32208: *43a*; bb 32958, bb 33521: *33*; bb 34583: *43a*; Cel./2—358, Cel./2—364: *17a*; Cel./2—379, Cel./IV—116: *43a*; Cel./V—201: *26*; Ja 1089: *12*; Ja 1306: *43a*; Ja 1556: *17b*; Ja 3382: *17a*; Ja 3933: *13*; Ja 6198: *43a*; Ja 6405: *17a*; T 1167: *41*. Nur 3412: *41*; SFN 11164, SFN 11817, SFN 19982: *17b*; SFN 26174: *41*; SFN 32679: *17b*; SFN 32695: *46* (T). Nyman 593: *31* (T).

[1]) Koorders' tree numbers have also been given to facilitate identification of sterile specimens. Of the herbarium numbers (*β*-numbers) only the fertile ones have been cited.

Oldham 201: *11*. Oro FB 30994: *29*. Osman 27978: *17b*.

Paniza PNH 9414: *27*. Parker 2224: *15*. Parkinson 5222: *43d;* 14707: *15*. Parry 70, 213: *2;* 1266: *15*. Pételot 4029: *43d* (T); 4499, 4588, 4589, 4592: *44* (T); 6160, 6161: *43d* (T); 6163: *43d;* 6359, 8013: *9*. Pichi-Sermolli 907: *2*. Pierre 687, 1422: *43d* (T); 1717: *13* (T). Pleyte 719: *43a;* 942: *33*. Poilane 803: *15* (T); 7152: *17b* (T); 7530: ?*15* (T); 10992, 11108: ?*15;* 15843: *43d;* 16031: *15;* 17180: *44;* 18062: *17b* (T); 19448: *43d;* 19650, 19801: *15;* 20058: *43d;* 21217: *43d* (T); 23266: *10* (T); 23877, 26034: *43d;* 26152: *15;* 28086: *43d* (T); 31214, 32308: *43d;* 35915: *7*. Prain's coll. 282: *43d* (T); 476, 592: *43d;* 743: *15;* s.n.: *43d* (T). Puasa-Angian 3922: *see note sub 43e*. Pulle 1005: *38a* (T); 1041: *17a*. Pullen 148: *22;* 252: *38b* (T); 306: *17c;* 470: ?*38b;* 946: *33;* 1378: *30*. Purseglove 3054: *2;* P 4286: *43e*. Put 3043: *15*.

Quisumbing BS 76643: *27*.

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